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ABSTRACT

Presented are a combination of classroom activities and sea shore field trips to help kindergarten students develop an awareness of the ocean and the life it supports. Among the multidisciplinary lessons included are those involving arts and crafts, mathematics, science, and language arts. Through studying the sea and its inhabitants, students can learn to make comparisons, count objects, and make careful observations. A 30-page student activity book and a list of teacher references are provided. (Author/WB)

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Alaska Sea Grant Program

ALASKA SEA WEEK CURRICULUM SERIES
KINDERGARTEN

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DISCOVERY

UNIVERSITY OF ALASKA

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DISCOVERY

A Study Guide for Kindergarten

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ALASKA SEA WEEK CURRICULUM SERIES

Field-test edition March 1980
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ACKNOWLEDGEMENTS

Sea Week began in the early 1970's in Juneau, Alaska. Under the leadership of Mary Lou King, parents, teachers and agency personnel started taking elementary school students down to the sea every spring. Soon, Sea Week was an annual event with some of the junior high and high school students assisting the younger pupils on their field trips to beaches, wetlands, forests and glaciers. In 1978, a K-6 Sea Week curriculum was written with the assistance of Juneau teachers, scientists, fishermen, parents, and government employees - a true community effort. In 1979, the Southeast Regional Resource Center revised the material, adding worksheets and graphics and reworking certain activities. In 1980, endorsed as "The Year of the Coast" by President Carter, it seems very fitting that the Alaska Sea Grant Program is initiating a program to spread Sea Week statewide.

This first statewide edition is a product of Juneau - its people and environment. We would like to express our deep appreciation to the many foresighted people who contributed to Sea Week and especially to all the students who are the reason and impetus behind its success. Special thanks to Mary Lou King, Nancy Barr, Janie Cesar, Carol Koski, Dick and Betty Marriot, Virginia Eggert, Claudia Kelsey, Kathy Hanna, James G. King, Lynn Szepanski, Karen Gunstrom, Mary Beth Parsons, Dan Hopson, Kristi Kantola, Pat Thrasher, Tamara Smid, Judy Maier, Jerry Hard, Marty Early, Jan Conner, Mark Hansen, the Alaska Department of Fish and Game, the Alaska Coastal Management Program, the United States Forest Service, the Alaska Department of Environmental Conservation, the United States Fish and Wildlife Service, and the South East Regional Resource Center.

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PREFACE

The Alaska Sea Week Curriculum Series (K-6) emphasizes one or more aspects of the marine environment at each grade level. Kindergarten materials, for instance, are intended to introduce students to the exciting and curious world of the sea and shore. At the other end of the series, materials for sixth graders stress man's interactions with the marine environment. While the subject matter at each grade level is unique, as a whole the grade level guides will yield a broad understanding of the marine environment and its importance to Alaskans.

The purpose of this curriculum series is to help the teacher in interpreting the marine environment for elementary school students. However, what is included here is just a place to begin. As you read the following materials, you will find factual information about many aspects of the marine environment, and suggestions for presenting these concepts to students through multi-disciplinary activities both in the classroom and at field sites. Materials are organized into units, each covering a single idea or subject. From these you, the teacher, may select the units and activities which are best suited to your class, community and resources.

"Sea Week" originated in Juneau, and these curriculum materials are most applicable to southeast and southcentral Alaska. However, the Alaska Sea Grant Program has funded a three year pilot project to expand Juneau's successful program statewide. As Sea Week is piloted in 14 communities around the state, the Curriculum Series will be expanded to meet the needs of western, interior, and northern Alaska.

Send us your comments and suggestions. The strength of the final edition will depend not only on those of us staffing the project - but on you - your ideas and comments. After you've tried some of these activities - fill out and send in the evaluation sheet at the back of this book. Thanks so much!

Jill Thayer/Belle Mickelson, Coordinators;
Mary Lou King/Nancy Barr, Consultants
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479-7631/7086

INTRODUCTION - KINDERGARTEN

For most Kindergarten students, a field trip to the shore can open up a whole new world. A world full of life forms that are unique, curious and wonderful. The joys and excitements of discovery cannot be greater than those among a Kindergarten groups first meeting such diverse shore animals as tiny snails, squirting clams and giant sea stars.

With the combination of classroom activities and sea shore field trips, students should develope an awareness of the sea and the life it supports.

The following are a few concepts the students will be exposed to:

1. The sea as an environment is very different from the land, i.e. salty, powerful, immense and rich.

2. The life supported by the sea is diverse. Examples: huge marine mammals, delicate, tenacious plants, numerous fish and curious bottom or shore-dwelling animals.

3. The sea is important to us; as a source of food, a reservoir for the earth's water, a place for travel, and an awesome source of inspiration.

Through learning about the ocean and its inhabitants, students may develop many skills. Some are included in the following:

1. Making comparisons - large or small, moving or stationary, thick or thin, rough or smooth.

2. Counting - the number of rays on a sea star, the number or snails on a rock.

3. Patience - quietly observing small living animals.

The following kindergarten materials incorporate as a multi-disciplinary approach: arts and crafts, poetry, visual and auditory experiences, math, "scientific discovery", listening and verbal expression. All can and should be a part of introducing the young student to the exciting world of the sea.

INTRODUCTION

Alaska has more than 33,000 miles of shoreline; the earth's circumference is only about 25,000 miles. Much of Alaska's complex and intricate shoreline is accounted for by the bays, inlets, headlands, islands of Southeast Alaska. Here, in Alaskan communities large and small we live in close contact with the marine world. Some of us make our livings by fishing or working for the Coast Guard, the State's marine transportation system, or marine shipping companies. Most of us spend at least some of our time sport fishing, digging clams, beachcombing, or just gazing out at the incredible scenery of snowcapped mountains and everchanging inland waters.

The dynamic marine environment of which we are a part is our heritage, our trust. It is only fitting that our children know that world intimately so that they can grow up in an understanding of its complexities, it subleties, its importance. This is of particular urgency now that Alaska is facing increasing pressures to make decisions that will effect the use of her lands and seas for generations to come. We, and our children, must have a part in the decision making processes and the more knowledgeable we are, the more effective our participation will be.

Teaching children about the world in which they live is important and perhaps it has never been more important than it is in Alaska today. Teaching facts and concepts about the marine world is important, but perhaps most important of all is the teaching of attitudes. It is hoped that through the study of marine life, students may gain the following:

1. An increased interest in their environment.

2. A greater awareness, appreciation, respect for the natural world that is so close about them here in Alaska.

3. The sheer delight, pleasure, happiness that can come from observing and understanding nature close up.

4. A sensitivity to the relationship between themselves and their environment.

If that can be accomplished, all our lives will be better because of it....

T H E O C E A N I S

OBJECTIVE

To introduce students to what the ocean is, to the qualities it has.

To learn that the ocean is important to us in many ways.

Teacher Information

To those of us who live in coastal Alaska, the sea is part of a way of life. We turn to it for food, for transportation, for recreation, for inspiration. Yet the ocean is even more than this.

"The sea covers 71 percent of the earth's surface. It was the cradle of life, and it still nurtures life. Every tear we shed is a reminder of our origin; indeed a coincidental 71 percent of the human body consists of salty fluids. Eighty percent of the world's animals and 50 to 80 percent of the earth's plant growth come from the oceans. Its green one-celled plants--phytoplankton--supply more than half of the atmospheric oxygen that sustains life."

This Fragile Earth. Part VI.
International Wildlife, vol. 7, No. 3

The sea is more than just interesting. The total world population depends on it for life. Our children need to learn to appreciate it and to be prepared to take care of it. In a beginning attempt to help them appreciate the magnitude of the ocean's importance, several specific aspects of the sea may be considered.

Unit 1. THE OCEAN IS BIG

Objectives

-To appreciate the extent of the oceans.
-To learn how oceans and land are tied together.

ACTIVITY 1: EXTENT OF OCEANS, WATER CYCLE.

Materials:

-globe or wall map of the world

Method.

Introduce students to the idea that the globe represents what our world looks like and that it is divided into land and water. It may help to point out to children the area which is the "lower 48". Also point out Alaska and the location of the community in which you live. Turning attention to the oceans, you might have students trace with their fingers the edges of the ocean so that they have a good idea of which area is ocean and of how large a part of the earth's surface water covers. Discuss with children the following questions--and others that come to mind or that are suggested by the discussion:

Is there more land or more water?

Where do the land and water touch?
Introduce the words "shore" and "shoreline".

Do you think there is land under the oceans?
Use the words "ocean floor".

What do you think it looks like on the ocean floor?
Point out that there are many features similar to those on land--mountains, valleys, plains--but the kinds of plants and animals are all different!

Do you think it is light or dark at the bottom of the ocean?
In the depths, it is very dark and cold. Some fishes that live there produce their own light.

Where does the water from streams and rivers go?
Point out some major rivers on the globe or map and be sure children know that all water from streams and rivers everntually flows to the ocean.

If the water of the streams and rivers all flows to the ocean, then why is there always water in the streams and rivers? Where does that water keep coming from?
You should be able to lead children to understand that water from the sea evaporates to form clouds ...

PUT OUT A SHALLOW DISH OF WATER AND WATCH WHAT HAPPENS TO IT OVER SEVERAL DAYS!!

that then drop their moisture over the land (and sea) as rain which fills the rivers.

Additional Activities

1. Art. Ask students to draw or paint a picture of what it is like at the bottom of the sea.

2. Language, art. As a class, write a simple story of a rain drop and its travels. Illustrate it for a class mural.

Unit 2. THE OCEAN IS SALTY

Objectives

-To understand the difference between fresh and salt water.
-To understand some of the properties of salt water.

Activity 1: Fresh Water and Salt Water

Materials:
-sea water--boiled the day before for ten minutes as a health precaution
-tap water
-two small containers per group of children

Method.

Before setting out the containers of tap and sea water, ask the children to predict whether or not they will find a difference between the two kinds of water. Lead them to think logically--on what do they base their ideas. If they are not sure that there will be any difference, encourage them to think about experiences they have had with fresh water (baths, drinking fountains, streams) and with salt water, and see if such remembrances bring to mind any differences.

Divide the class into small groups and give each group one container with tap water and a second one with sea water--containers should be unmarked or marked so that only the teacher can tell by the marks which is which.

In the following order, have students

look at
feel
smell
taste

the two samples. As they do, ask the following questions:

Can you tell by looking at the water, which is sea water and which is from the tap?

Can you feel a difference in the two? How does each one feel?

Can you tell by smelling which is which?

Can you tell by tasting which is which?

Only after all the children have used four senses to examine the samples, should you tell them that sea water is also called salt water. Can they tell you why? Discuss with the children differences in how salt water and fresh water can be used. (Land plants and animals--including man--must have fresh water in order to thrive and survive, but fresh water may be lethal to sea plants and animals that require a salt water environment!)

Talk again about the water cycle and ask students how it can be that water on land is fresh if it really comes from the sea as ocean water evaporates to form clouds (and rain).

Supplementary Activity: Evaporation of Salt Water

Materials:

-salt water
-shallow pan

Method.

Pour tap water in a shallow pan and an equal quantity of sea water in another. Over several days time, observe what happens. Have students look at what is left in each pan. Have them taste what is left in the pan that contained sea water. Explain that when water evaporates from the ocean, the salt is left behind--thus we can get fresh water from the ocean!

Activity 2: Float or Sink

Teacher Information

"Density" is a word too complicated for kindergarteners, but they can understand what it means indirectly--as related to the sink-float qualities of fresh and salt water. Salt water because it is denser than fresh water (has more mass per unit volume) offers more support to objects placed on it than does fresh water. The density of the objects too is a variable--the more dense the object, the more likely it is to sink; the less dense, the more likely that it will float.

Materials:

- -sea water in a container
- -tap water in a container
- -miscellaneous small objects--coin, feather, ball, marble, etc.

Method.

Have children work either in small groups or as a whole class. Tell students that they are going to do an experiment to see what kinds of items will sink or float in fresh or in salt water. Before trying each item, have the children predict what they think will happen to it. Then let them test their theories!!

The difference between how high an object will float in fresh water and how high it will float in salt water may not be very great--children may have to look carefully.

You might have children find additional objects they would like to try and have them make individual predictions about them. Finally, ask them if it would be easier for them to float or swim on salt water or fresh.

Unit 3. THE OCEAN IS MOVING AND POWERFUL

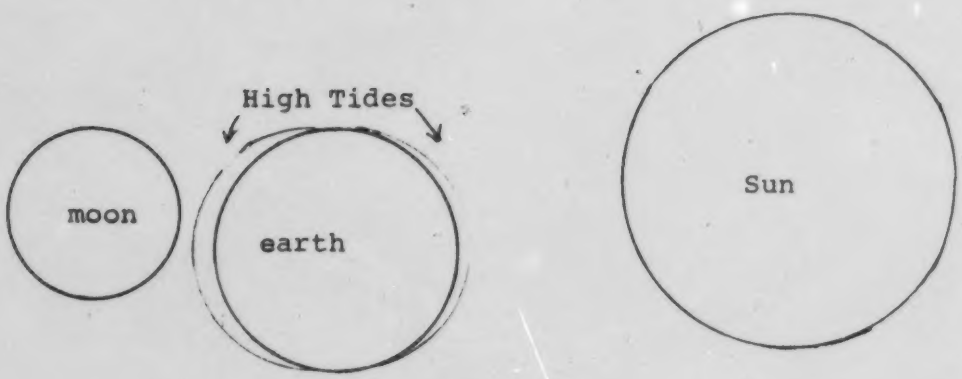
Objectives

- -To understand what tides are and what difference they make to our shores.
- -To understand what a wave is and to know the force that it contains.

THE OCEAN IS .... MOVING AND POWERFUL

Tides-

The gravitational pull of the moon and the sun on the earth's water causes tides. Because the moon is much closer, the moon's pull is about twice as strong as that of the sun. Ocean water facing the moon bulges that way, the oceans on the other side of the earth bulge towards the sun. So, there are two regions of high tide at the same time. The one on the moon side being greater is called the peak high tide. In between the high tides are the regions from which water is drawn to make them--low tide!



off - Exploring the Olympic Seashore
S. Forrest Blau
National Park Service, 1976

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Activity 1: Tides

Teacher Information

Tides are caused by the gravitational pull of the moon and the sun exerted on the earth's oceans. Because the moon is closer to the earth, its gravitational force is greater--about twice that of the sun. Ocean water on the side of the earth facing the moon is attracted toward the moon, and ocean water on the side of the earth facing the sun is pulled outward in that direction. While some areas of the earth--or the oceans--are experiencing high tides, other areas from which the ocean's waters have been drawn away are experiencing low tides.

Materials:

- -photographs showing the same scene with the tide in and the tide out
- -a wall on which you feel free to make chalk marks
- -chalk
- -tide table

Method.

Talk to the children about tides. Explain to them that sometimes the water level at the beach is higher than it is at other times. Show them the two pictures of one scene with tide in and tide out. Encourage them to see and point out differences in the two pictures.

Move to a discussion of the idea that the sun and the moon act on the waters of the earth like giant magnets. Have a child drop an object and ask what happened to it. Explain that it fell because the earth pulled it to itself--like a magnet. Explain that the sun and the moon pull things to them too--and that one of the things they pull to themselves is the water of the oceans. When the ocean's water where we lived is pulled toward the sun or the moon, the tide is high. When the ocean's water is pulled toward the sun or moon some where else, it is pulled away from where we live and the tide is low.

Ask the children what they think the difference in height might be on a wall between a low and a high tide on a local beach. If we imagined that when the tide was all the way out, the water level was right at the floor, how high would the water rise when the tide was all the way in.

Choose a day from the tide table, or make up numbers, or--perhaps best of all--find in the tide table the date of the day on which you are doing this activity. By subtracting the level of the low tide from the level of the

previous or following high tide, find the tidal change for that day--for instance 12 feet. Divide that number by the number of hours over which the change occurs, about six, and you have a rough estimate of the rate of change, i.e., two feet per hour.

During a class session, at intervals of one hour, call children together to place a mark at the level of the imaginary tide. Start at the floor, make a mark at, for our example, two feet higher at the end of one hour, an additional two feet higher at the end of the next hour and so forth. Encourage children to imagine that they are at the beach as this is taking place--are their toes getting wet? do they have to swim for higher ground? When you have made as many marks as time permits, explain that tides get even higher (those in southeast Alaska may have a range of more than 24 feet--a height perhaps as great as that of your school building).

Additional Activities

At the beach

1. Observe the level of the water when the group arrives at the beach. Perhaps take a stake or stick (that is expendable) and push it into the beach surface at the water's edge. Check it later to observe what has happened to the water level.

Activity 2: Waves

Teacher Information

The water at the top of the ocean is called the surface. Wind blowing against the surface causes waves. Large waves can cause great damage, change the appearance of beaches, destroying boats, damaging large ships. Even small waves are capable of exerting great force.

Activities

At the beach

1. Encourage students to examine the stones and boulders on the shore and note how smooth they are. Through questions and comments bring them to realize it is the water that has worn them smooth. Try to imagine how much work it would be for one of us to smooth and round a rock!

Pick up a hand full of sand and ask students what they think sand is and where it came from. Bring them to understand that sand is created by the constant force of the sea grinding up shell and rock.

2. If your school is near the ocean and if you can find enough adults to go with you, take the class to the shore--but keep at a safe distance--on a stormy day to observe the power of the waves first hand. Waves are capable of tossing great logs and other debris into the air, so although the sea is impressive under storm conditions, keep students well away from the water itself.

Unit 4. THE OCEAN IS A WAY OF TRAVELING

Objective

-To understand that the ocean is important in transporting people and goods.

ACTIVITY 1

Materials:
-globe or wall map
-pictures of ships--old and new, various sizes and shapes

Method.

Help children understand the importance of ocean travel by asking and discussing some of the following ideas:

-How did Columbus and later the pilgrims get to America? Could they have come by some other way?

-Do you think early people living in Alaska might have traveled by boat? Why? What kinds of boats might they have used?

-What kinds of boats do we use in Alaska today for travel? Can you name any of the state ferries?

ADDITIONAL ACTIVITIES

1. Arrange for the class to go aboard one of the state ferries when it is docked in your community. Arrange ahead of time for someone aboard the vessel to show your students around the ship.

2. Language experience. If you go aboard a ferry, write a class thank you note.

3. Art. Have children draw or paint a picture of a way of traveling on the ocean. Or create a class mural on the same subject.

Unit 5. THE OCEAN IS A WAY OF LIFE

Objective

-To learn that the lives of many people are closely tied to the sea.

ACTIVITY 1

Materials:
-appropriate pictures if available

Method.

With the help of the class, make up a list of kinds of people who make a living from the sea--fishermen, scientists, ship's crewmen, marina operators, ships chandlers, boat charter operators, Coast Guardsmen.

Talk about what each of these kinds of people do. Talk about them specifically in your community if they are represented there. Encourage children to talk about their parents or people they know whose jobs are tied to the sea.

ADDITIONAL ACTIVITIES

1. Field trips. If possible arrange one or more field trips. Consider the following possibilities:

-Visit a fishing vessel to see the gear, the fish hold, to learn how the fishing is done and what it is like to be a fisherman.

-Visit a state or federal laboratory facility and find out what kind of research is conducted in relation to the sea.

-Visit a state ferry and find out how the crewmen who work on the ferry live, when they work, and what their jobs are.

-Visit a marine supply store to dicover what is sold and how the items that are sold are used.

-Visit a marina or a boat harbor and talk to the owner or the harbor master about the problems of taking care of so many boats.

2. Art, Language. Make a mural, class bulletin board, or individual books based on what has been learned about lives that are tied to the sea. Make pictures of men fishing, of a ferry boat loading, etc.

Unit 6. THE OCEAN IS A SOURCE OF FOOD

Objective

-To explore the many kinds of food that come from the sea.

ACTIVITY 1: A TASTING PARTY

Materials:
-foods from the sea

Method.

Enlist the help of parents--or of the community. Arrange to have an assortment of foods from the sea brought to school for the children to taste. If possible involve, students in some or all of the preparation--perhaps even in the gathering of the food. Many Alaskans, especially native Alaskans, rely heavily on the sea for their food. Encourage members of your community to share their knowledge with your class. Perhaps the tasting party could be an event to which parents are invited. Try to provide a variety of foods--fish, snails and other invertebrates, seaweed--and encourage the children to sample everything.

You might also bring in samples of seafoods purchased in the supermarket so that children may see and sample these as well. If no other way is available, the tasting party could be based entirely upon materials from a store.

Unit 7: THE OCEAN IS BEAUTIFUL

Objective

-To realize that the ocean is a source of endless pleasure to all our senses.

Activity 1

AT THE BEACH. Help children see and feel and hear the beauty of the sea. At some time during your beach visit, have them close their eyes and listen for the water sounds and bird sounds and wind sounds. Have them smell the sea and feel the breeze. Have them just sit quietly and observe and think about what they see. Perhaps later in the classroom you will want them to try to put their experiences into words or pictures.

Additional Activities

1. Poetry. Share one or more of the following poems with the children. Use them as a basis for discussion, art projects or language experiences.

"Down On The Beach"

by Dorothy Aldis

Down on the beach where its shining and wet
We sit on the sand.
Its hot where we sit.

When we dig with our shovels the deep sand is wetter,
And that is the sand which always is better
For castles or tunnels:

But then when we bake
Of course we use dry sand
For frosting our cake.

from All Together
D. Aldis

* * * * *

"Until I Saw The Sea"

by Lilian Moore

Until I saw the sea
I did not Know
that wind
could wrinkle water so.

I never knew
that sun
could splinter a whole sea of blue.

Nor
did I know before,
a sea breaths in and out
upon a shore.

from I feel the Same Way
Lilian Moore

"Palace"

by Dorothy Vena Johnson

A sea shell is a palace
Where many echoes dwell,
And when I listen to them
I know them all quite well.
They are like the ocean's roar
Where the sea shell buried deep
Learns why the sea is always salt,
And spooky shadows creep.

from Poems & Rhymes - Childcraft

* * * * *

"Mine"

by Lilian Moore

I made a sand castle.
In rolled the sea.
"All sand castles
belong to me -
to me,"
Said the sea.

I dug sand tunnels.
In flowed the sea.
"All sand tunnels
belong to me -
to me,"
Said the sea.

I saw my sand pail floating free.
I ran and snatched it from the sea.
"My sand pail
belongs to me -
to ME!"

I Feel the Same Way
Lilian Moore

"Alone by the Surf"

by Leila Kendall Brown

There is no world sound -
Only stillness of stars,
Silence of Sand,
A single shell,
By the sliding sea.

from Poems & Rhymes - Childcraft

* * * * *

"Shore"

by Mary Britton Miller

Play on the seashore
And gather up shells,
Kneel in the damp sands
Digging wells.

Run on the rocks
Where the seaweed slips,
Watch the waves
And the beautiful ships.

from Poems & Rhymes - Childcraft

* * * * *

"The Picnic"

by Dorothy Aldis

We brought a rug for sitting on,
Our lunch was in a box.
The sand was warm. We didn't wear
Hats or shoes or socks.

Waves came curling up the beach.
We waded. It was fun.
Our sandwiches were different kinds.
I dropped my jelly one.

from All Together
D. Aldis

THE OCEAN IS. . .

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M A R I N E M A M M A L S

OBJECTIVE

To recognize some of the common marine mammals in Alaskan waters and to acquire some basic knowledge about them.

Teacher Background

Marine mammals are an important part of Alaska's marine environment. Whales, porpoises, walruses, and seals all live in Alaskan waters--and any child who lives near Alaska's extensive coastline either has or will undoubtedly see one or more of these or other marine mammals.

Like the mammals that live on land (horses, cows, deer, dogs, cats, man, etc.), these animals all share the distinctive characteristics of mammals. They -

1. Are warm blooded
2. Breathe air
   (Marine mammals live in water but do not have gills like fishes. They must surface to breathe air).
3. Have true hair at some stage in life
4. Give birth to live young
5. Suckle young with milk the mother produces.

Although some of these ideas may be a bit difficult for kindergarten children to comprehend, they can learn that in many ways these creatures of the sea are like they are--that they are our closest "relatives" in the sea.

Unit 1. WHALES

Objectives

-To comprehend the size of a whale.
-To learn the differing kinds of whales.
-To learn what whales occur in our waters and to know something about them.

Teacher Background

Whales are the largest animals in the world. Their sleek, streamlined shape well suits them to moving easily through the water. They have lost almost all body hair--something which further helps reduce friction with the water. Instead of having walking legs, whales have one pair of paddle-shaped flippers, or fore-limbs, that are used for maneuvering in the water. The powerful tail is broadened into two fleshy extensions called flukes, these the whale flexes up and down to propel itself forward.

To breathe, a whale must come to the surface of the water. Its "nose"--called a blow-hole--is not on the front of its snout but rather is on the top of the head. Thus the whale can breathe whenever it breaks the water's surface with its back--there is no need to lift its head out of the water. More often seen than whales themselves are their spouts--air that is expelled from the animals lungs and made visible to us, as water vapor forms when the warmed air cools. Each whale species has a distinctive size and shape to its spout.

Whales have some amazing qualities. They are intelligent and social animals. They court, fight, and defend and train their young. They have a keen sense of hearing and can make sounds which they use to communicate with each-other--often over distances of several miles.

There are two major types of whales - Baleen whales and toothed whales. Baleen whales have no teeth. Thus they can only feed on food that they can swallow whole. Toothed whales do have teeth and thus are hunters that can consume larger prey. Baleen whales have a two hole blow-hole while toothed whales have a one hole blow-hole.

BALEEN WHALES

Baleen Whales don't have teeth but have horn-like "feathers" that hang from the roofs of their mouths like combs. The whales suck in the plankton and krill, then squeeze the water out of their mouths with their tongues, retaining the food, which is then swallowed.

Baleen whales roam the oceans, migrating from the poles to the equator. They feed at the poles in the summer (where food is abundant) and also wean their young at this time. Then they migrate to the warm waters, where they mate or give birth. (There is little food, but

the calves don't need it, as they are nursing and the adults have stored fat (blubber) from the previous summer.

Gray and Humpback whales travel 4-6,000 miles--longest migration of any mammal. (The gray whales pass along our outer coast).

Calves nurse underwater--mother "squirts" milk down calves throat; the calf does not suck.

(Newborn blue whales, the very largest, weigh two tons at birth, are 25 feet long, and gain about 100 pounds a day, and grow 2 1/2" a day.)

The natural life span is not known.

Kinds of baleen whales:

Rorquals - (tubed, or "pleated" whales)
Blue whale, Fin whale, Humpback,
Sei, Brydes, Minke.

Others - Right whales, Gray whale,
Greenland

In the early whaling days, Rorquals were not hunted because they were too fast, and sank when they died. Technology overcame the "problem" later. Right whales are so named because they were slower, and they floated.

Baleen whales are not usually deep--their food is near the surface, (within 30 feet). A usual dive lasts 10-15 minutes. The blow-hole closes. Injured whales go deeper, stay longer.

Whales have oily "tears" to protect their eyes from the salt water.

Baleen whale most commonly seen in Southeast Alaska -

Humpback Whale

Small dorsal fin--about 50 feet long. Slow swimmer. Athletic, playful. Large head, with distinctive "bumps". Long flippers--18 feet. Black on back, mottled on underside. Migratory.

Toothed Whales

The only very large member of this group is the sperm whale. (Teeth in lower jaw only). (While it is a toothed whale,

it is in a family by itself, and is sometimes considered separately).

Sperm Whales have huge, box-like heads, with narrow lower jaws that can open at right angles to their heads.

Sperm whales dive deeper than any other whale--can stay down 1 1/2 hours.

Squid is major source of food.

Sperm whales don't pair up, but males have harems.

Dolphins and porpoises are toothed whales, or cetaceans, too.

Porpoises, Dolphins travel in schools. They travel fast (20 mph); eat fish, are playful, and "talkative". Also very intelligent.

Dolphins hearing is second only to bats.

Dolphins seem to have awareness of individuality. They will help each other (members of a school will support an injured member on the surface, to prevent drowning).

Young dolphins are "parented"; calves are nursed for about one year.

Beluga (white) and Narwhals (unicorn-projection)--
polar whales

Beaked Whales--not considered edible, so they are, were not harassed. They are deep-water whales.

Killer Whales are members of the Dolphin family.

Males may be thirty feet long, and weigh eight tons.

Killer whales eat fish, seals, birds, will attack larger whales. They travel in packs.

Toothed whales (cetaceans) commonly seen in Southeast Alaska -

Killer Whale (toothed)
Tall "shark-like" dorsal fin. Handsomely marked, black with white. Males thirty feet. Fast moving. Often roam in packs. ("sea wolf") voracious, dangerous.

Harbor Porpoise
Solid color--travel in larger groups. They do not "run" with a boat.

Dall Porpoise
Black and white markings. Most often in open channel--will play and run with a boat.

In the Classroom or Playground

Activity 1: The Size of a Humpback Whale

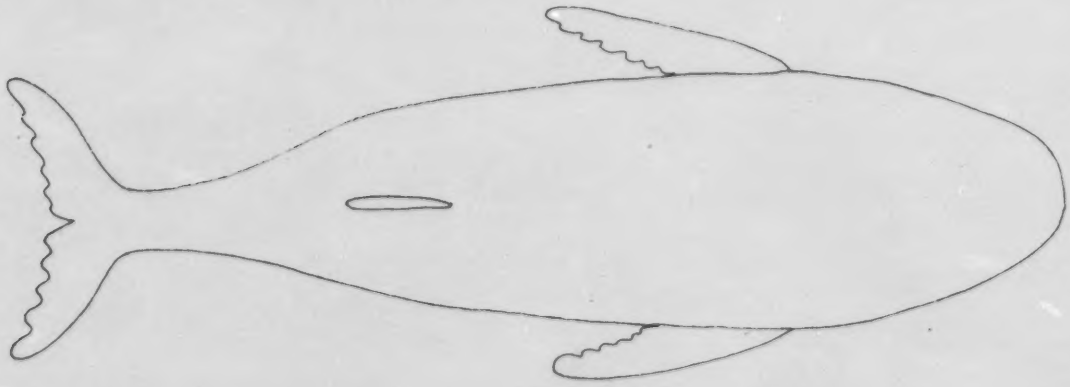
Objective

-To comprehend how large a humpback whale really is.

Materials:
-tape measure
-playground area (open--without equipment) at least 50 feet by 20 feet.
-stout stick or other implements for drawing lines in the dirt.
-rake

Method.

Choose a sunny day--or at least one without rain. With the help of the students measure out a distance of 50 feet. Then using the diagram below, measure and rough out the other dimensions.



Length	50'
Greatest width	7'
Length of forelimb	14'
Width of flukes	8'

With adult supervision, have children outline the body, flukes, and fore-limbs of the whale. With the rake, roughen the animal's body so that it stands out better from the surrounding background. Allow plenty of time for this!! Perhaps enlist older students to help--or do some advance preparation, such as measuring and rough outlining, in advance.

Just seeing a whale outlined will enable students to comprehend the size of the animal. However, you might also take some student measurements:

> How many students can fit within the fluke outline of the whale?
> Holding hands, with arms outstretched, how many children fit from snout to flukes?
> How many arm lengths long are the flukes?

Other Activities

1. Science. Be sure to discuss with students some of the concepts included in the teacher background section.

2. Science. Read or paraphrase a book such as:

   Scheffer, Victor. "The Year of the Whale"
   Johnston, Johanna. "Whale's Way"

3. Art. Construct a large, stuffed whale to hang from ceiling. Cut it from butcher paper, stuff with newspaper, staple together. Have children paint it. Glue on popcorn for barnacles.

4. Science. Listen to part of the record, "Song of the Humpback Whale".

5. Language Arts. Make up a class story about a whale.

Unit 2. SEALS AND SEA LIONS

Objectives

-To comprehend the size of seals and sea lions.
-To learn the differences between them.
-To learn which seals and sea lions commonly occur in local waters.

Teacher Background

Seals and sea lions belong to the order pinnipedia, meaning "fin-feet".

True Seals are earless--they appear to have holes in their heads. True seals have hind flippers that extend backward. True seals are awkward on land, but more streamlined and well-adapted to the water than sea lions. Pups are born singly--not in litters, and they are weaned after about a month. They learn to swim and lose the white coat they were born with. True seals will haul themselves up on rocks or beaches, but remain close to the waters edge. Some migrate, others do not.

Sea Lions have small, external ears, and their flippers are larger--the rear flippers face forward. They are more comfortable on land than true seals. (One third of their lives are spent on land). The pups are weaned after about one year. Pups are grey. Bull sea lions have harems.

Of the four major species, the California sea lion is best known (the circus "trained seal"). The steller, or Great Northern Sea Lion is the largest, and is less "tameable". Stellers are near sighted on land, but have keen eyesight in water. Steller sea lions surface with their food (fish, squid, octopus) and gulp it down. This avoids swallowing too much sea water. High mortality rate on pups--50 %.

Sea lions escaped commercial exploitation because their hair was not considered desirable.

'Taking a "lost" baby seal home or skinning any dead marine mammal found along the beach is illegal under the Marine Mammal Protection Act of 1972. This Act also makes it a federal crime to kill, capture, or harass any marine mammal, although exceptions are made for scientists, aquaria and commercial (not sport) fishermen by special permit. Eskimos and Indians who take marine mammals for food and clothing are also exempt!

from: Exploring The Olympic Seashore
S. Forrest Blau
Nat. Park Service, 1976

Seals and Sea lions commonly seen in Southeast Alaska:

Harbor Seal

True (no ears) seal. Non migratory. Also called common seal, spotted seal, hair seal. Usually seen singly, or in small groups. Quiet, "shy", unobtrusive.

Steller (Great Northern) Sea Lion

Not a "True" seal (ears present). Larger, browner than Harbor seals. Gregarious, playful. Hauling out place at Benjamin Island - "local" island in Lynn Canal.

In the Classroom

Activity 1 Size of a Seal - Draw a seal on a large piece of butcher paper to show the relation size of a seal. A mature harbor seal is six feet long and weighs 300 pounds.

Additional Activities

1. Math - Cut out large tag-board sea lion, seal. Tape sack to back. Make herring from construction paper and have children put glitter (silver) in the sides. Count the herring the sea lions "eat".

2. Science - Share with children Victor Sheffer's Year of the Seal.

3. Art - Construct sweet potato sea lions. Have children bring in potatos. Pin raisin eyes. Make pin holes at sides for whiskers and insert broom straws. Prop front up with toothpicks.

   Arrange "herd" on a rock pile and you have a rookery. (Kay Goines)

Unit 3. SEA OTTER

Objective:

To learn what a sea otter is.
To learn the difference between a sea otter and a and otter.

Teacher Background

A sea otter may grow to about 3 feet long and may weigh as much as 85 pounds. It has a thick, glossy coat with white tipped hairs that give it a frosted look.

The sea otter comes out of the water to rest on rocky shores, but it spends most of it's life in the sea - usually in beds of large kelp. There it swims, floats on its back or plays. It dives to the sea floor to find the water's surface, turns onto its back, and rests in the water while eating. May bring rock up from the sea floor and use it to break open an urchin, holding everything on its chest as if it were a table.

Sea otters were once abundant along Alaskan coasts but were extensively hunted for their fur during the days of Russian influence. Now they are protected. There are still many sea otters around some of the Aleutian Islands and they have been re-introduced in other coastal areas of the state.

Sea otters should not be confused with river otters. The latter, which are common in many coastal areas of Alaska live primarily on land but enter the ocean to feed on bottom fishes and other marine animals. A land otter may be seen swimming along, often parallel to shore, often diving and showing its long, slender tail - but it never turns on its back and lies in the water feeding the way a sea otter does.

IN THE CLASSROOM

ACTIVITY 1:

Objective:
To learn to recognize a sea otter and know something about it.

Materials:
Illustrations of sea otter.

METHOD

Show the children the illustration of the sea otter. Discuss with them what it is. (Be sure to discuss the differences between a land and a sea otter if it is relevant in your community.)

ADDITIONAL ACTIVITIES - MARINE MAMMALS IN GENERAL

In the Classroom

1. Science - Classification. Using cut-out pictures of mammals and fishes, have the children classify them according to similarities and differences.

2. Language, Art - Make a book (a class project) of sea mammals (or a single species). Include drawings by students, magazine pictures, facts, class dictation.

3. Art - Make a sea mammal mobile. Use driftwood. Cut out pictures of sea mammals. Include natural objects (abalone, shells, etc.) or pictures of food sea mammals eat.

4. With student help, make a bulletin board with pictures of marine mammals.

5. Supplement class work with films, slides as available.

6. Share with students books that include Indian or Eskimo legends about marine mammals or utilization of them.

At the Beach

ACTIVITY:

Be ready to take advantage of the appearance of a marine mammal. While it can never be anticipated, it can be a highlight of a field trip to the shore. Be prepared to help students know what marine mammal they are seeing and encourage them to observe it and discover whatever the can about it.

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S E A S H O R E A N I M A L S

OBJECTIVE

To recognize the most common animals of Alaskan shores and acquire some basic information about them.

Teacher Background

To children - as well as adults - the animals that live on our seashore are an endless source of fascination. Any study of marine life should cerainly include a field trip to the beach if at all possible. Such a trip should be one of discovery, exploration - and excitement. To prepare them for this experience, children should be involved in classroom activities which will help them better understand what they will see at the shore.

Unit 1. Sea Stars

Teacher Information

Sea stars belong to the group of animals called Echinoderms, a reference to their spiny skin. Like their relatives the sea urchin spines are an important part of their body structure. Sea stars all have a central area called a disc and from five to 24 or more rays that extend from it. The lower surface of the animal includes a mouth in the center of the central disc and, extending the length of each ray, a groove bearing the tube feet on which the sea star moves. Each tube foot acts like a tiny suction cup which the star can cause to attach to any surface or cause to release - this is done by controlling the water pressure in a system of internal, water filled canals.

The upper surface of the sea star bears elaborate microscopic structures - spines, tiny pincers for protection, "fingers" of body wall through which the animal takes in oxygen. The most obvious structure on most sea stars is a roughly circular, bare area that is like a sieve plate and through which water enters the canal system to maintain the proper pressure in the tube feet.

On Alaskan seashores there are several common species of sea stars. Most of them have only long, scientific names, such as Evasterias trochelii, but no easy common names at all. Thus having children learn the different species name is not essential. What can be done, however, is to look at the sea stars carefully and decide by thinking about color, size, and texture how many different kinds are found.

Sea stars are active, but slow moving animals that spend most of their lives searching for food. The diet of animals of a particular species may include only one or a few kinds of food, but taken as a whole, sea stars feed on a wide variety of marine animals - including other sea stars! Some stars are capable of extruding the stomach outside the mouth so that they can surround a food object with it and thereby feed on something too big to be drawn through the small mouth opening.

IN THE CLASSROOM

ACTIVITY 1: THE SHAPE OF A SEA STAR

Objective:

To learn that sea stars may have 5-24 rays, that they come in many sizes, colors, and textures.

Materials:

-transparencies of sea stars;
books with illustrations of sea stars, etc.

METHOD

Show students the natural variety that occurs in sea stars. Then follow up with one, or more, of the following art projects:

1. Sea Star Mosaic:
Dried beans, seed pods, small stones, wood or paper, glue.

   Let each child design his/her own starfish by creating a star shaped design of small objects glued to a background.

2. Sand Paper Sea Star:
Sandpaper, crayons

   Let each child cut a sea star shape out of sandpaper, and heavily crayon on a design. Then place finished sea stars on a cookie sheet. Bake in 250 F oven for 10-15 seconds, til crayon melts.

3. Worksheet:

   Using student worksheet, (master copy in back) have children create own color design for a sea star.

4. Mural:
various media -
tissue paper collage, wet chalk, melted crayon
water colors, crayon resist

Depict the various forms of life in the mural including background of rock, sand, seaweed etc.

Could be ongoing project as you study each animal.

ADDITIONAL ACTIVITIES

1. Poetry - READ the following poem, or a different one about a sea star-

The Starfish
by David McCord

When I see a starfish
Upon the shining sand,
I ask him how he liked the sea
And if he likes the land.
"Would you rather be a starfish or an out-beyond-the bar fish?"
I whisper very softly,
And he seems to
understand.

He never says directly,
But I fancy all the same
That he knows the answer quite as well
As if it were his name:
"An out-beyond-the bar fish
Is much happier than a starfish,"
And when I look for him again
He's gone the way he came.

At the Beach

ACTIVITY 1: SEASTARS

Objective: To discover sea stars and how they live.

Method:

As children find and examine sea stars on the beach, encourage any adults who are helping with the field trip to ask them some of the following questions:

-Where did you find a sea star? Is it close to the water or high up on the beach?
-Does it live by itself or in a group?
-What other animals are nearby?
-How does a sea star move?
-Touch a sea star. How does it feel? Do sea stars that look different from each other feel different?
-Is it alive or dead? How can you tell?
-How does it keep warm? Or does it need to?

If several kinds of sea stars are found, have children compare sizes, number of rays, colors of several indivduals.

Unit 2. LEARNING ABOUT SEA URCHINS

Teacher Background

Sea urchins, like sea stars, are spiny members of the Echinoderm class. They have a rounded internal skeleton called a test. On the test are many knobs to which the spines are attached and on which they pivot. An urchins spines are mainly protective but they also help in locomotion. Like sea stars, urchins have tube feet, but among urchins these are on long, slender "stalks", that can be stretched out so they extend beyond the tips of the spines. The tube feet help the urchine move, help it keep itself clean, and sometimes help it move food to its mouth, which is in the center of the underside of its body. Urchins often feed by scraping algae or tiny particles of food from rocks but they feed on large algae and on dead organisms as well.

IN THE CLASSROOM

ACTIVITY 1: The Sea Urchin

objective:
To learn to recognize the shape of a sea urchin.

Materials:
Transparencies, or other pictures of sea urchins.

METHOD

Discuss with students the shape and habits of a sea urchin. Follow this introduction up with one or both of the following projects:

1. Worksheet: (copy in accompanying envelope)

   Have students color the urchin an appropriate color. Suggest that they draw additional baby urchins on the sheet. Have them count them aloud.

2. Art:

   Have each student child design his or her own sea urchin using clay (Baker's clay) with tooth picks inbedded for the spines. Bake in 350 F oven until hard. Let children paint the urchins with tempera paint.

At the Beach

ACTIVITY 1: Discovering Sea Urchins in Their Own Home

Objective: To discover as much as possible about sea urchins.

To develop ability to make observations.

METHOD:

As children find sea urchins on the beach, encourage any adults who are helping with the field trip to ask them some of the following questions:

-What sizes, what colors of urchins do you find?
-Where do you find them? Are they low on the beach or high?
-Who lives nearby?
-Are any of the urchins in large groups?

If sea urchin tests are found, compare a test with a live urchin. Look at the knobs on which the spines turn and the holes in the test through which the tube feet extend. Examine the delicate bones of the complex mouth structure. Feel and describe the textures and pattern of the test. Have the children carefully hold a sea urchin on a bare hand. Have them hold still and concentrate on thinking about how the spines and tube feet feel as the urchin moves them.

Unit 3. SEA SHELLS

Teacher Background

Sea shells belong to a very large group of animals called mollusks. This group includes limpets, chitons, snails, clams, and even the octopus! The most commonly seen sea shells on Alaskan beaches are the snails and clam-like shells.

Snails are often called univalves because their shells have only one part, or valve. Many univalves have shells that spiral around a central column, but the cap-shaped limpets are univalves too. Inside the hard, protective shell of a univalve lives a soft animal that has one broad muscular foot on which it moves, and a head that is equipped with eyes, sensory antennae, and a mouth. Part of the soft animal called the mantle produces the shell - and as the animal ages, both the soft animal and its shell grow larger.

In addition to its shell, many univalves are equipped with an operculum. The operculum is a tough, horny "lid" that can be used to seal up the aperture of the shell. The soft animal will draw inside to protect itself from a predator or from drying out in the air if it is left exposed when the tide goes out.

Clams, cockles, and mussels are bivalves - or animals with shells of two parts, or valves. In general, bivalves are less active than univalves. They are often to be found burrowed beneath the surface, completely hidden except for the tip of a tube-like siphon which they use to bring them food and oxygen.

Sea shell designs are almost endless in their variety and it is hard to resist picking up a pretty shell. Remind children, however, that if the animal inside the shell is alive, it cannot survive long away from its natural home. If a specific activity has been planned, collecting a few empty shells is fine, but try to encourage students to enjoy the beach and its creatures but to leave it as nearly as possible the way they found it.

IN THE CLASSROOM

ACTIVITY 1

Objective:

To learn that a sea shell is a home for an animal.

To understand that sea shells represent a wide variety of forms, colors, and sizes.

Materials:

Empty shells, pictures of shells, drawings of shells, worksheets

METHOD:

Encourage students to bring to class shells that they might have at home. With student and teacher materials, set up a group of shells for the students to handle and examine. Discuss with them the differences among the shells - size, shape, weight, whether bivalve or univalve. Follow this activity up with one or several of the following additional activities:

1. Science - What is a shell made of? Put broken bits of shell in vinegar (a weak acid) and observe the reaction. Try chalk, beach sand, gravel, coral, etc. (Shells are made of calcium carbonate, a basic material that will react when in the presence of an acid.)

2. Conservation - Discuss the importance of not taking a living animal away from the beach.

3. Science - Invite older students who are studying shells to come to the class to lecture and show shells to the younger students.

4. Math - Glue small shells onto numbered tongue depressors for counting practice.

5. Number the compartments of a muffin tin 0-11. Give the child 66 shells and ask him/her to place the correct number of these in each compartment.

6. Language arts - With the class or individuals, discuss how it would feel to be a shell, an animal's home. What kinds of things would you see, feel, think about?

7. Art, Language - Have students draw pictures of several shells and make a shell book.

8. Art - Design a shell mobile using a variety (colors, shapes, sizes) of shells.

9. Art - Use clay or other modeling materials to sculpt a reproduction of a shell. Either of the two "recipes: that follow will provide the raw materials:

    1. Flour Clay -
       1 c. flour
       1 c. salt
       1 rounded tasp. powdered alum

       Mix these three ingredients together. Add water slowly and knead until the texture of clay. Store wrapped in wet cloth and plastic.

    2. Bread and glue -
       Fresh white bread
       Elmer's or white glue

       Crumble bread. Mix with it enough glue to form a dough. Shape into desired form and let dry. When models are dry, spray with clear sealer or coat with nail polish before coloring with water colors or other paints.

10. Art - Use shells or shell fragments to make a collage on burlap, to make a sea life picture by combining shell materials with painting or other art techniques.

11. Science, Art - Make a nature study wall hanging. Use plastic "seal tight" sandwich bags that come in a roll. Tear off as many sections as length requires. Reinforce. Each section will hold a different shell.

12. Science - Make a small beach in a box, including items found along with shells, (sea weed, driftwood, sand, crushed shells, etc.).

13. Cooking - Bring in commercial clams for children to see, open, examine (keep in ice water). Clam shells pop open steamed in a pot with a small amount of boiling water. Let children taste the clams. DO NOT USE CLAMS YOU HAVE COLLECTED ON THE BEACH. ALASKAN CLAMS OFTEN CONCENTRATE A TOXIN AND MAY BE POISONOUS.

14. Art - Make rubbings from rough textured shells. Onion skin paper and a pencil works well.

15. Student book - Have students complete the shell worksheet (enclosed in back folder) and add it to each child's cumulative book.

16. Language - Read poetry about shells. Two examples follow:

The Shell — David McCord, Far & Few

I took away the ocean once,
Spiraled in a shell,
And happily for months and months
I heard it very well.

How is it then that I should hear
What months and months before
Had blown upon me sad and clear,
Down by the grainy shore?

The Sea Shell

Sea Shell, Sea Shell,
    Sing me a song, oh, please!
A song of ships and sailor-men,
    Of parrots and tropical trees;
Of islands lost in the Spanish Main
Which no man ever may see again,
Of fishes and corals under the waves,
And seahorses stabled in great green caves -

Sea Shell, Sea Shell,
Sing of the things you know so well.

At the Beach

ACTIVITY: 1

Encourage children to find as many different kinds of shells as they can - both univalves and bivalves. Lead them to discover whether the shells are empty or contain living animals. If a shell is still home to a live animal, discuss with the child the need to leave it just as it was found.

Unit 4. Hermit Crabs

Teacher Background

Hermit crabs are crustaceans and thus are relatives to shrimp, other crabs, lobsters, and barnacles. They are very specifically adapted to living with their abdomens tucked into empty shells or other protective structures. Thus, while the walking legs and forward part of the animal have a hard protective outer skeleton, the animal's abdomen is soft. Because most hermit crabs live within coiling snail shells, their abdomens are curved and end in a hook-like structure that helps anchor the animal firmly in the shell house.

Like all other crustaceans, hermit crabs can grow only by shedding their tough external skeleton and replacing it with a new, larger shell. As a hermit crab grows, it must also find a larger snail shell for itself. Thus, periodically, a hermit seeks out a new, larger acceptable shell, quickly releases his grip on his old home, and takes up residency in the new home of his choice.

For the most part, hermit crabs are scavengers, feeding on whatever bits of animal material they can find.

Most hermit crabs found on Alaskan beaches are small, often living in little periwinkle shells. Occasionally a large - sometimes bright red - hermit crab may be found above the water's level, but in general, the larger hermit crabs live in water deeper than that of the intertidal zone.

IN THE CLASSROOM

ACTIVITY 1: Observing Hermit Crabs

Objective:

To see the size, the way of feeding and moving, and the interactions of several hermit crabs.

Materials:

a flat, glass, plastic, or enamel pan, several hermit crabs from a local beach and clean sea water

METHOD:

Place clean sea water and hermit crabs in the pan. Either tip the pan so that there is a dry end or put a rock, or pebbles in the pan so that the hermits can get out of the water. Put the pan and crabs in the coolest location in your room. In order for the crabs to survive, the water should be as cool as possible and should be changed every few days so it will be clean and not depleted of oxygen.

Feed the crabs bits of recently dead mollusc or small pieces of frozen shrimp. Remove food pieces that are not eaten.

Encourage children to observe and talk about the appearance and behavior of the hermits.

ADDITIONAL ACTIVITIES

1. Art - Design shells out of cardboard boxes large enough to "wear".

2. Body Movement - Do a "crab walk", with or without a student made shell, or have "crab walk" relays - dividing children into teams and laying out a course or goal for each team or each team member.

3. Finger Play - Try the following as a group activity:

   Finger Play

I'm a little hermit crab	(fingers of) (1 hand creep) (across table)
Looking for a hermit shell	(cup the opposite hand) (a short distance in front) (of the creeping fingers)
I see one.	
Here I come	(The creeping) (fingers jump)
This one suits me very well.	(inside the) (cupped hand)

4. Student book - Complete the worksheet on a hermit crab (included in back pocket) and add it to the accumulating student booklet.

5. Language Arts - READ the following poem, or another one about a hermit crab:

"Crab"
V. Worth

The dead crab
Lies still,
Limp on the dry sand.
All strength to crawl
Gone from his hard shell...
But he keeps a
Shape of old anger
Curved along his claws.

6. Language Arts - Read, or paraphrase, to the group either of the following, excellent books on hermit crabs:
Holling, C.H. Pagoo Houghton Mifflin Co., Boston. 1957. Castellanos, A Shell For Sam

At the Beach -

ACTIVITY 1:

In the excitement of exploring the beach, children will in all probability find a number of hermit crabs. Have adults who are with the group encourage students to think about the following ideas:

- What does the hermit crab look like?
- Where was it found? In the dark, in the sun, where it is warm, or cool, under a rock, in a crevice, on sand, mud?
- What other kinds of animals or plants were living nearby?
- How does the hermit use its' claws?
- How does it move?
- If two or more hermit crabs are found, compare sizes, colors, etc.

One interesting behavior to watch for: hermit crabs often cling to the sides of bedrock tidepools (or on algae in these pools) in large numbers, and when a shadow looms over the pool (as for example a person peering into the pool) many of them will curl up defensively and tumble down the sides of the pool to rest on the bottom. Discuss the survival value of this kind of escape behavior.

Unit 5. Barnacles

Teacher Background

Barnacles are crustaceans and are closely related to crabs and shrimps. When they are very small they live in the open water and look like shrimps or crabs of the same size.

When it has reached a certain size and stage, the barnacle settles to the bottom of the sea, attaches to a hard surface by its head and begins to grow a hard "shell" around itself. It's legs become feeding structures.

The six-sided barnacle has a trap door made up of four plates. When it chooses, the barnacle can slide the plates of the trap door open, extend it's legs and sweep them through the water to catch tiny particles of food.

Once it settles to the sea floor and grows its hard covering, a barnacle never moves. It may live for 3-5 years.

IN THE CLASSROOM

ACTIVITY 1:

Objective:

To recognize a barnacle.
To learn how a barnacle lives

Materials:

Pictures of barnacles, barnacle pattern (enclosed in packet), scissors, white glue, or tape, 2 white fluffy feathers (commercial, craft-type) or 6 white fluffy-type pipe cleaners, 1 1/2 section of a toilet tissue tube, clay-lump about walnut size

METHOD

Briefly discuss what a barnacle is, stressing that it is a tiny, soft animal - like a crab or shrimp - that has built a hard house around itself for protection.

Then - let the children make their own barnacles!

1.

cut out pattern pieces, fold.

2.

glue or tape overlap.

"Shell"

3.

put lump of clay inside section of tube. Insert feathers or pipe cleaners in clay.

4.

pull circle down over feathers, to rest on top of tube.

5. Put shell down over it all.

Surface for finished barnacles - glue to cardboard, heavy paper, driftwood plank, etc. Surface can be made interesting with sand, pebbles, beach shells, etc.

At The Beach -

ACTIVITY 1: BARNACLES

-Look for different sizes of barnacles; there are distinct "year-classes" of them according to size.
-Do they settle on other things besides rocks? Algae maybe? Other animals? Wood?
-What happens when they grow larger and crowd tightly together? (This is fairly common.)
-Feel the texture of a barnacle - covered rock.

Unit 6. Sea Anemone

Teacher Background

Anemones belong to a group called the Cnidaria which also includes jellyfishes and corals. The body of an anemone consists of a thick column, the top of which bears numerous finger-like or feathery tentacles. The tentacles capture food for the animal and convey it to the mouth which is located in the middle of the tentacles on the top of the column.

Anemones depend on the water for support. When they are stranded by a receding tide, they look like gelatinous masses. When the tide returns and covers them, however, they can again stand upright and once more look like lovely sea flowers.

No one knows how old an anemone may get to be, but people who have studied them believe that they may grow to be very old, living just as long as they have food and are left alone. Anemones do not move very fast, but they can creep over the sea floor very, very slowly, using the base of the column as a foot.

IN THE CLASSROOM

ACTIVITY 1: THE SHAPE OF AN ANEMONE

Objective:
To familiarize students with the name and form of an anemone.

Materials:
Pictures of an anemone,
Worksheet with an anemone

METHOD

Share with the students any pictures of anemones that are available. Have the children think about what they look like and the kind of movements they might make. Using the worksheet (in the back of this book) encourage them to express their own concept of the animal. Follow this activity up with one or several of the following additional activities:

1. Look up "anemone" in the encyclopedia; point out differences and similarities between flower anemones and animal anemones.

2. Language Arts - Make up stories or maybe a skit about animals like the anemone (or barnacles or clams) which sit still and wait for food to come to them and other animals (like snails, crabs, salmon, etc.) which move about, actively seeking food. Maybe something like a fable.

3. Dance Activity - Have a group of students stand back to back in a tight circle with arms waving in the air to portray an anemone. Show reactions to tide ebb and flow, food passing by, threat of danger, etc.

At The Beach -

ACTIVITY 1: AN ANEMONE IN ITS NATURAL ENVIRONMENT

Objective:
To be able to identify an anemone and to think about its appearance and how it lives.

METHOD:

With the help of any adults accompanying the children, explore with them the following questions:

-Where did you find the sea anemone?
-Does it live alone or with other anemones?
-To what is the anemone attached?

Encourage children to feel the anemone and describe how it feels. If an anemone is found in a tide pool or in shallow water, suggest that a child pretend his/her fingers are food for the anemone and place it in the center of the tentacles. As it would with a real food item, the animal will fold its tentacles as if in the center of the mouth. To us, or to a child, an anemone can do no harm and the finger can be easily withdrawn. Urge the children to be gentle so the animal is not hurt.

Unit 7. Beach Homes

Teacher Information

This unit is based on a field trip to the beach. Classroom work suggested concerning specific beach animals will give good background for the field trip.

In planning for the field trip and thinking about what the children will see, remember that the intertidal zone is a hazardous one. Shore life is subjected to extreme swings in temperature, salinity, predation - and exposure to light and air. The differing environments created by the tide changes have resulted in unique forms of adaptation - parts of which may be studied by inspecting the "beach home lives" of the intertidal inhabitants.

One excellent resource book for the teacher is Questions and Answers about Seashore Life, by Ilka Katherine List. Every teacher on the beach should have access to a copy!

A trip to the beach will be one of discovery. To help give understanding to the childrens discoveries, to help them form questions, draw conclusions, build knowledge - teacher background is necessary. A spirit of discovery is an asset, and an ability to "manipulate" is helpful! Lead students to new discoveries through questions like the following: "Look at these mussels. Are they living creatures? How are they attached to the rocks?" (Let kids discover the "threads.") (Test strengh of threads.) "Why so strong?" (protection, waves). "Do you think mussels can

move, if they want to?" (They can - they have a foot like a clam.") "Why might a mussel want to move?" (too crowded).

Observations to share with students:

1. Upper beach - Sand is coarser, usually inhabited by sandfleas, beetles, flies, perhaps some small barnacles.

2. Middle beach - Discover how high or low on the beach barnacles are growing. Note their shape and sizes. Where they are crowded, they are elongate. Help children discover their differing shapes.

3. Lower beach - Past the mid-point of the intertidal zone, going toward the sea, a greater variety and abundance of animal life will be seen. Look for CLAM, LIMPETS, WORMS, BLENNIES, SNAILS, SEA STARS, SEA ANEMONES, SPONGES, CHITONS, HERMIT CRABS, MUSSELS, SEA URCHINS. Look carefully under seaweeds. Carefully lift and replace stores. Note any residents on stone underfaces of in sand.

   Below the low tide mark there is yet more sea life. If wading is possible, children may see additional sea-folk such as SCULPINS, CRABS, FLATFISHES.

   At low tide, the chief activity of many beach inhabitants is to avoid drying out. Encourage children to discover ways and places animals use to keep damp.

   When the water level begins to rise with the incoming tide, animals that are once again submerged become increasingly active. Ask children to look for this and explain what the animals are doing. (feeding.)

4. Homes: Note how some beach animals make their homes on others-barnacles on almost everything, anemones on rocks, shells, etc. See how many combinations of creature and surface students can find.

5. Sand or mud surfaces - Look for tell-tale signs of animals that live beneath the soft surface - holes, tracks, mounds, etc. Carefully try to excavate the residence.

6. Litter - Take a sack along for picking up human litter. The beach animals don't want litterbugs messing up their homes!

Follow-up activities in the classroom

Objective:
To help students summarize what they have seen and learned about the beach and its inhabitants.

Teacher notes -

Some projects you may want to do after going to the beach may require beach materials. If so, judiciously collect materials while at the shore. Collect only what you will actually use - no more. And be sure that any shells you have gathered are empty and have no creatures growing on them. Over-enthusiastic gathering could quickly strip our beaches of much of their intriguing life forms!

1. Creative Writing - Make a book about the field trip. Take children's dictation. Include facts (and fantasy), pictures, etc.

2. Art - Make plaster casts of sea creatures using the following directions:

   plaster
   soft clay, such as Play-doh
   a box larger and deeper than the object to be cast
   a shell, sea star, or other beach object

   If the creature to be used in casting is soft, freeze it. Put a thick layer of clay in the box, being sure that the layer is thicker than the object to be cast. Press objects into clay until half buried; lift out carefully. (Re-do impression if necessary.)

   Mix plaster as indicated, pour slowly into mold until it is 1/2 inch thick along sides of box. Insert paper clip at appropriate place if cast is to be hung.

   When plaster is thoroughly dry, peel away box and clay. Use model as is or paint it with water colors.

3. Art-Science - On butcher paper or cardboard, make a beach. Have children draw, paint, glue pictures and/or natural objects on the beach, placing each in its approximate beach home location.

4. Math - Use collected shell materials in counting activities

5. If preserved specimens are available, look more closely at some of the kinds of creatures that were seen on the beach.

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S E A W E E D

(Marine Algae)

OBJECTIVE

To learn by touching, seeing and tasting seaweed what it is and what its uses are.

Teacher Background

Seaweeds are algae, which means that they contain chlorophyll (the green pigment that plants must have to manufacture their own food), have no roots, and do not produce flowers.

Large seaweeds are divided into three groups according to their color. Green algae take their color from the chlorophyll they contain. Red algae and brown algae contain additional pigments which give them the predominant red or brown color. The presence of red or brown pigment enables the plant to produce food materials with less light intensity than if only green pigment is present. In general, green algae are found in the most shallow waters, brown algae are somewhat deeper, and red algae can live deepest of all.

Seaweeds may be found growing on any hard surface. They do not have roots to anchor them in a soft substance such as sand or mud, but instead cling to rocks, pilings or shell with their special means of attachment called a holdfast. The holdfast may look like a small circular button or may consist of numerous finger-like projections that grow downward and cling to a hard surface.

Seaweeds are important in the sea because they provide food for many animals and because they often form thick beds or mats under which fishes and invertebrates may hide. Many kinds of seaweeds are edible, including numerous kinds that grow in Alaskan waters.

IN THE CLASSROOM

Unit 1. TASTING SEAWEEDS

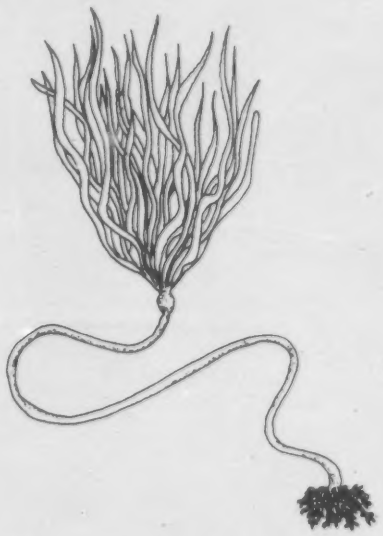
Objectives

-To learn that some of the plants of the sea are edible.
-To encourage children to try tasting something unfamiliar.
-To feel, examine, think about some of the local kinds of seaweeds.

Teacher Background

Of the several kinds of edible Alaskan seaweeds, the two most easily collected are bull kelp (Nereocystis lutkeana) and sea lettuce (Ulva or Monostroma). Both may be found--sometimes abundantly--on the beaches of southeast Alaska.

Bull kelp is a large brown alga that grows in relative shallow water and is often washed up on beaches. It has finger-like projections for its holdfast, a long thick stipe (or stalk) that may be several feet long. Atop the stipe is a bulbous, gas-filled bladder that gives the plant flotation and enables it to keep the upper plant near the water's surface. From the bladder grow the great long fronds of the bull kelp.



Sea lettuce may be found growing in the low intertidal zone. It looks like limp lettuce leaves, is brilliant green and very thin.

Depending on when you plan to use the seaweeds in class, either collect algae from the beach before taking a general class field trip to the shore or, if you find a good supply of algae, bring some back from the class outing. To keep the algae in good condition until it is used, you may place it in the refrigerator in a plastic bag with moist paper towels for a few days.

ACTIVITY: SEAWEED RECIPES

Following are several recipes and projects you might try with the class using bull kelp or sea lettuce.

BULL KELP

Krazy Kelp Kandies

2 cups bull kelp circles
vinegar
2 cups brown sugar
1/4 cup water
2 teaspoons ground cinnamon

Find a newly beached bull kelp whose stipe has the texture of a crisp, hard apple. Cut off about 30.5 cm. (1 foot) of the stipe where the diameter is 2.5-5 cm. (1-2 inches). Store it in a moist plastic bag in a cool place until you get home.

At home, cut the stipe into 6 mm (1/4 inch) "Life Saver" circles - enough to make 2 cups. Place pieces in a pan and cover with vinegar (do not use wine vinegar). Mix 2 cups kelp, 2 cups brown sugar, 1/4 cup water. Bring mixture to a boil, stirring until sugar dissolves. Add 2 teaspoons ground cinnamon, turn heat down and let mixture cook very slowly, uncovered for one hour.

Using a slotted spoon for fork, lift the kelp from the syrup, draining over the pan a few seconds, and place in a shallow pan with 6 mm (1/4 inch) brown sugar on the bottom. Using a fork, coat kelp with brown sugar and spread to dry and cool on a plate. You and your friends will enjoy krazy kelp kandies. Any remaining syrup may be used on pancakes, waffles, french toast, or over ice cream.

From Exploring the Olympic Seashore
S. Forrest Blau
National Park Service, 1976

Kelp Relish or Pickles

Use stipes no longer than 15 feet and sections that are no more than 3 inches in diameter. Snap off a piece to test for freshness; if it breaks crisply, it will make good pickles. Chop off the bulb and "tail."

Pare kelp with a vegetable peeler and slice into thin rings. Rinse in cool water. Soak rings in cool water for 3 days, changing water 2-3 times a day. On the fourth day, place rings in cold water to cover. Bring to a boil and simmer 12-14 minutes. Drain and measure.

For each quart of rings bring to a boil and simmer together for 5 minutes:

3/4 cup cider vinegar
2-1/2 cups sugar
1 teaspoon mixed pickling spice
a few cloves

Pour above over rings and let stand overnight. Next day, drain off syrup, heat to boiling point and pour over rings. Let stand another night. Fill hot jars with kelp rings, cover with hot syrup and seal. Let stand a month before serving.

SEA LETTUCE

Sea Lettuce Salad

Wash sea lettuce very carefully, shred finely and add to a salad.

Sea Lettuce as a Vegetable

After washing, drop lettuce in a pan of boiling, salted water. Cook 2 minutes. Remove from heat. Drain. Serve with butter and a little vinegar.

IN ADDITION:

You might want to try tasting some seaweeds that are not from local beaches. Consider the following:

Purchase kombu (Hessonicopsis littoralis) dry and packaged in the grocery store. Wash the kelp to make it pliable. Combine: ground pork, a little sugar, soy sauce to taste. Make small cakes of the pork, sugar and soy sauce. Wrap each cake with a piece of kombu, fastening it with a toothpick. Steam until pork is well done. Eat warm.

Recipes from Edible? Incredible!
Furlong and Pill

Ask your children if any of them eat seaweed at home. Some families, especially those who are Alaska natives, may use local seaweed as a regular part of their diet. If possible, expand the class's knowledge of seaweeds by having a resource person come in to explain or demonstrate how other local seaweeds are used. See if you can have enough seaweed treats for all the children to taste!

Unit 2. FEELING SEAWEEDS

Objectives

-To create craft projects from seaweeds.
-To learn about seaweeds by handling them.

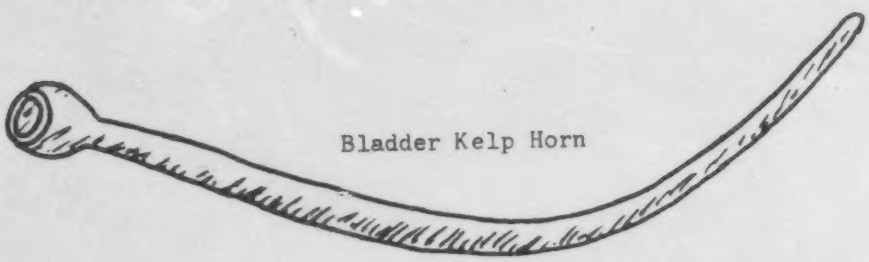
ACTIVITY 1: KELP CARVING-FACES, HORNS

Materials:
-bull kelp bladders
-knives, sticks, broken shell, other implements for cutting

Procedures.

For a FACE, carve the kelp bladder just as you would a pumpkin. Experiment to make different faces and designs. You might demonstrate this to the students, then if you have enough bladders, let students--either singly or working in pairs or groups--carve faces using blunt utensils.

For a HORN, cut off 1/2 of the bulb and part of the stipe leaving the remaining half of the bulb attached to a length of stipe several feet long. Take a deep breath and blow into the stipe, keeping your lips tight as if blowing a trumpet. You can produce a mellow sound or even a tune if you practice enough.



Bladder Kelp Horn

ACTIVITY 2: PRESSING SEAWEED

Materials:
-small, delicate seaweeds
-bucket of sea water

-drawing paper, 12"x18"
-shallow pan larger than sheets of paper
-paper towels
-cheese cloth
-newspapers

Procedure.

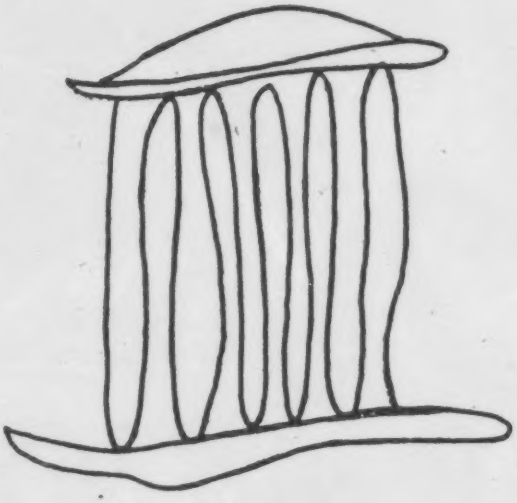
Collect algae from the beach and put it in a bucket of sea water to keep it fresh. (Use as soon as possible after collecting.)

Place a piece of drawing paper in the pan and cover with sea water. Float and arrange a piece of algae over the paper. Gently lift the paper from the water with the algae on top. Place on newspapers, cover with cheese cloth, more newspapers, and finally with books. Let dry for several days. Natural gelatins in the algae will cause them to stick to the paper, but if the algae is thick, you may need to glue it after it has dried.

When the algae is dry, it may be used to make note paper, cards, placemats, or wall hangings. It can be mounted on wood or other stiff materials to make a plaque.

Activity 3: Seaweed Weaving

Material:
-2 large pieces of driftwood
-jute twine
-seaweed



Procedure.

Wrap the two pieces of driftwood with jute and add an additional strand for hanging. Using seaweed you or the children have gathered, weave seaweed into the jute. Allow to air dry and hang.

Additional Activities

1. Music, dance. Find a recording of DeBussy's "The Sea." Play the record (part of it) for the students, letting them listen to it and imagine algae rocked rhythmically back and forth by the motion of the sea. Then, ask them to pretend they are algae and to move - either as if they were attached to the bottom of the sea or adrift at its surface.

2. Art. Read to the children the following exerpt from "Seaweed" by Robert L. Stevenson:

Ever drifting
drifting
On the shifting
currents of the
restless sea

Ask them to draw or paint a picture of seaweed in the sea.

3. Creative writing. As a class project or with individual students, write an imaginative story about seaweed, for instance one entitled:

The Adventures of a Floating Seaweed

that begins:

One day while adrift on the sea, I... ..

Have the children illustrate the story and use what they have done to create individual books or perhaps a class mural.

4. Math - Follow the numbered dots to draw the seaweed.

AT THE BEACH

During a field trip to the beach, it is the shore animals that create the most excitement for children. Try, however, to encourage them to be aware of seaweed too. If there is seaweed on the beach, encourage children to think about some of the following questions:

1. Where did you find seaweed?
2. What colors are the ones you found?
3. How do they feel?
4. Compare likenesses, differences, size, shape, etc., of specimens collected.
5. What kinds of seaweed did you find in tidepools? On rocks? On shells?
6. Where did they <u>not</u> grow?
7. Do any animals seem to be making use of seaweed?
8. Is seaweed like land plants? (roots, stems, leaves, flowers, seeds?)
9. Do all seaweeds float?

B I R D S O F T H E S E A S H O R E

OBJECTIVE

To become familiar with the appearance and habits of birds common to Alaskan shores.

Teacher Background

Many species of birds are to be found along Alaska's beaches and in her coastal waters. Like all birds, they may be grouped by where they live, how they move, and how they feed. The Audubon Society Bird Study sheet that is included with these materials graphically illustrates how these differences can be related to the appearance of each kind of bird. Scientists group birds according to their appearance --swimmers, tree perchers, predators, divers, insect eaters, seed eaters, probers, waders, etc. Bird books group birds by appearance too. Be sure to describe and discuss these differences with students when you are discussing specific birds.

In southeast Alaska, crows, gulls, ravens, eagles, ducks, and geese are often seen along or off the shore. These are all relatively large birds and one that kindergarteners should easily be able to learn to recognize. In the following paragraphs is some general information on each of these six groups.

CROWS. Only one crow occurs in southeast Alaska. Called the Northwest Crow or the Fish Crow, it is smaller than the common crows of the fields and farms elsewhere in America and grows to a length of about 17 inches. It is solid black, has a quick wing beat for so large a bird, and makes a loud "khaa" sound. Crows are most often seen in groups of a few to several hundred, and they often "work" the beaches, scavenging on whatever food materials they may chance to find. They are year round residents of southeast Alaska, but seem to be most abundant - at least in the Juneau area - during the warmer months.

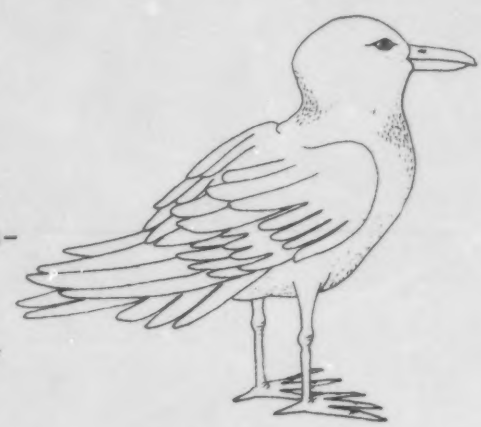
RAVENS. Like crows, the Common Raven is totally black. It is, however, much larger than the Northwest Crow, growing to as much as 27 inches total length. If flies by alternately

flapping its wings, then gliding. Ravens are usually solitary or in pairs, never occuring in the large groups that characterize crows. Unlike the harsh sound of the crow, the call of a raven can be almost melodious and its variations many. The Raven is extremely important in Tlingit traditions. They believe he is the creator of the world and many narratives exist about his deeds.

EAGLES. Alaska is one of the few places in the world where Bald Eagles are still common. In southeast Alaska, they are frequently seen along beaches perched in tall evergreen trees so they can watch for schools of fish at the water's surface, for sick or dead fish floating on the water or for injured water fowl. Bald Eagles feed on flesh and in coastal areas may find their food in salt water, on the beaches, or in streams where salmon are spawning and dying.

Bald Eagles reach a length of as much as 43 inches and may have a wing spread of 6-8 feet. Immature birds are mostly brown and have a dark bill. With maturity, these markings change gradually until the mature bird has a white head and tail and a yellow bill. Bald Eagles have a call that almost sounds like a squeal or screech - not at all what might be expected from such a large, imposing bird. Their eyesight is extremely keen and they can see distinctly to far greater distances than we can. Although they do so infrequently, bald eagles are capable of landing in the water (usually to capture prey) and then using their wings to scull to shore.

GULLS. A number of species of gulls may be found in Alaskan waters. Of these, the Glaucous-Winged Gull is one of the largest and most common - at least in southeast Alaska. Immature birds are a dusky grey-brown and have dark bills. Mature Glaucous-Winged Gulls are grey with white head, tail and breast, and have a yellow



BIRD STUDY *Bills, Feet, Tails* and *Wings* reveal many bird habits – they are wonderful examples of nature's amazing ingenuity in solving the problems of survival.

Hairy Woodpecker

FOR EXAMPLE:

the WOODPECKER'S strong, chisel-shaped bill is adapted for chipping wood as a means of boring into trees in search of grubs. Its feet have two sharp toes directed forward and two backward which clamp the bird securely to the tree trunk in an erect position. Sharp-pointed tail feathers act as props to steady the woodpecker while it uses its bill as a hammer.

BILLS of birds are variously adapted for procuring different foods and serve also for nest building, preening feathers and for protection.

FEET are built for perching, scratching, walking, swimming, for seizing prey.

WING size and shape vary greatly. Some wings are designed for soaring, for sudden turns and rapid flight, for easy long distance travel.

TAILS provide balance when perching and flying; are rudders during flight.

Adaptations of BILLS

SEED-EATING—bill short, thick bill for crushing seeds. *Examples:* Sparrow, Grosbeak, Bunting,—Finch *(shown)*

Bill upper and lower mandibles crossed to enable bird to extract seeds from cones of evergreen trees. *Example:* Crossbill *(shown)*

INSECT-EATING — bill slender, pointed beak for picking up insects. *Examples:* Warbler,—Vireo *(shown)*

Bill very wide mouth for catching insects on the wing. *Examples:* Swallow, Nighthawk, Swift

PROBING—bill long, slender bill for probing in mud in search of food. *Examples:* Snipe *(shown)*, Woodcock, other Sandpipers

Bill long, slender bill for probing the necks of flowers to feed on nectar. *Examples:* Hummingbird

PREYING—strong, sharp, hooked bill for tearing flesh of prey. *Examples:* Owl, Hawk, — Falcon *(shown)*

STRAINING—broad, flattened bill for straining food from mud. *Examples:* Flamingo, Duck,—Goose *(shown)*

GROUND-FEEDING — short, stout bill for feeding on the ground, as a hen. *Example:* Bob-White *(shown)*

FISH-EATING—bill long and sharp for spearing fish. *Example:* Heron *(shown)*

Bill with a flexible pouch underneath bill for holding captured fish. *Example:* Pelican *(shown)*

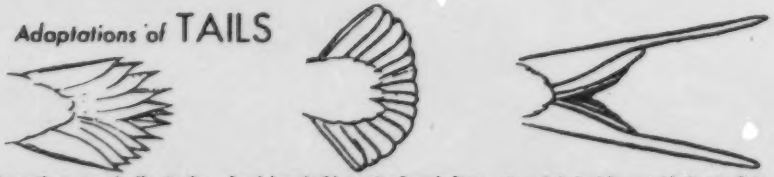
Adaptations of WINGS

Long, pointed wings for fast, easy flight in the pursuit of flying insects. *Examples:* Swallow,—Swift *(shown)*

Long, broad wings for strong, soaring, effortless flight. *Examples:* Hawk *(shown)*, Eagle

Short, rounded wings for speedy take off and fast flight over comparatively short distances. *Examples:* Sparrow, Quail,— Pheasant *(shown)*, Woodcock, Grouse

Adaptations of TAILS



Tail feathers with strong, spine like tips for use as a prop or support when clinging to vertical surfaces. *Examples:* Woodpecker, Swift,—Brown Creeper *(shown)*

Broad, fanned tail for soaring. *Example:* Buteo-type Hawk *(shown)*

Long, forked tail for graceful, distracting flight and extreme maneuverability. *Examples:* Tern, —Barn Swallow *(shown)*, Frigate Bird, Swallow-Tailed Kite

Adaptations of FEET

PERCHING—three toes in front, one toe behind. Most familiar birds are of this type. The foot automatically clasps the perch when the leg is relaxed. *Examples:* Sparrow, Chickadee,—Robin *(shown)*

WADING—long legs, long, slender toes. The three long toes keep bird from sinking into the mud. *Examples:* Gallinule, Heron,—Sandpiper *(shown)*

PREYING—powerful feet and legs with strong, curved, sharp talons for grasping prey. *Examples:* Hawk, Owl,—Eagle *(shown)*

SWIMMING—three front toes fully webbed. *Examples:* Goose, Gull,—Duck *(shown)*

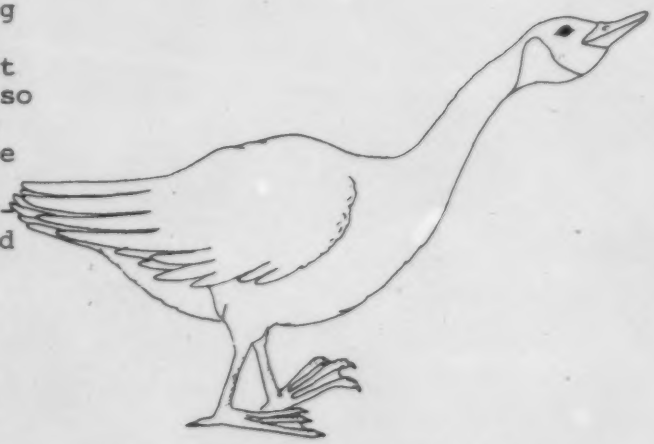
CLIMBING—two toes in front, two toes in back; sharp claws for clinging to an upright surface with ease. *Example:* Woodpecker *(shown)*

SCRATCHING — claws strong and blunt for raking or scratching the ground for food, as a hen. *Examples:* Pheasant, Quail,—Grouse *(shown)*

bill. Glaucous-Winged Gulls will feed on small fish they catch by diving at them when they show at the water's surface, but they will also harass diving ducks to cause them to drop food they have taken or they will scavenge along beaches for any edible materials.

DIVING DUCKS. In the winters in southeast waters, diving ducks may be abundant. These are the waterfowl that occur most often in small groups or great rafts and that habitually paddle at the water's surface, then dive beneath the surface to feed on small fishes, bivalves, or other animals. Some of the diving ducks frequently seen are Barrow's Goldeneyes, Common Goldeneyes, Surf Scoters, White Wing Scoters, Harlequins, Buffleheads, American Mergansers, and Common Mergansers.

GEESE. Geese do not normally land on open salt water, but in spring or fall they may often be seen flying overhead. Some areas, such as Juneau, also have resident populations of Canada Geese so that these birds may be seen year round. Canada Geese are distinctively marked, being generally grey-brown and having a black head and neck and white cheeks. Geese in the air follow a leader but because of air turbulance can not fly directly behind in single file but must string out on either side of the leader like military planes. Groups of migratory SWANS may sometimes be seen overhead as well - such birds may be distinguished from Canada Geese by their white color, greater individual size and by their call which is generally softer than the honking of the Canada Geese.



IN THE CLASSROOM

Unit 1. LEARNING ABOUT COMMON BIRDS ALONG ALASKA'S BEACHES

Objectives

-To learn to distinguish crows, ravens, eagles, gulls, ducks, and perhaps geese.

-To learn that each of these birds has a body form that is well suited to the way it lives and feeds.

Activity 1: Class Discussion

Materials:

-films, slides, pictures, drawings of the birds that will be discussed

Procedure.

With the children, discuss what they think crows, ravens, eagles, ducks, gulls, and perhaps geese might eat. Build upon their own knowledge and experiences. Discuss how the bill and feet of each of these birds is fitted to its way of living and feeding. As much as possible, let the children work out the connections. Discuss the way in which gull, crows and ravens help keep our beaches clean. Be sure that children know that eagles, ravens, and gulls are protected by law and cannot be killed. Discuss the effect that man's presence has had on these six common birds, whether it has been good or bad and in what ways.

Additional Activities

1. More information. The Alaska State Museum has a good supply of materials on birds and a large collection of mounted specimens. If possible, take a field trip to the Museum, arranging ahead of time for someone on the museum staff to work with the class group.

2. Language Experience. Have each child dictate a short "event" concerning beach birds for an experience chart or for a bird book to take home.

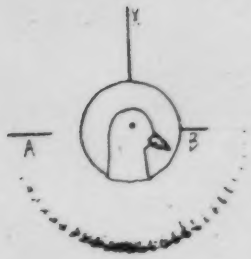
3. Handwriting Worksheets for Eagles, Ducks, Raven, Crow, Gull and Geese.

4. Comparison Worksheets on Raven and Crow.

5. Math - Counting Worksheets.

6. Art. Make a bird collage by cutting pictures of beach birds from magazines and glueing them to cardboard or pinning them to a bulletin board, making each picture touch others. Add feathers, pieces of egg shell, whatever else imagination suggests.

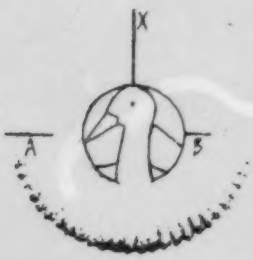
7. Art. Create a flock of gulls or geese using the following directions from the December, 1977 issue of SUNSET:

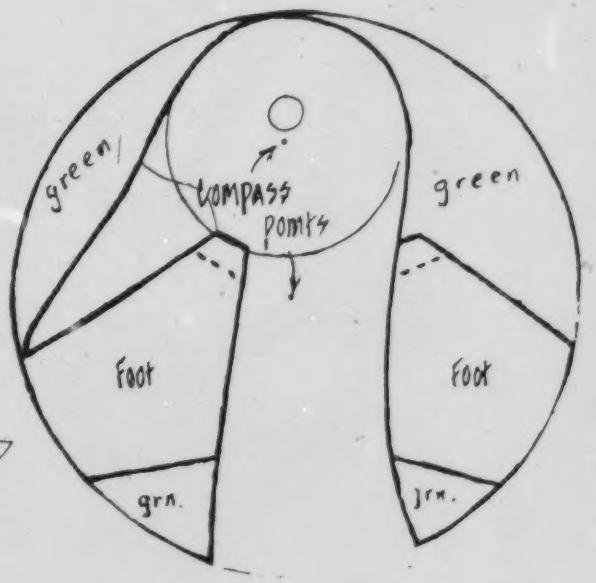


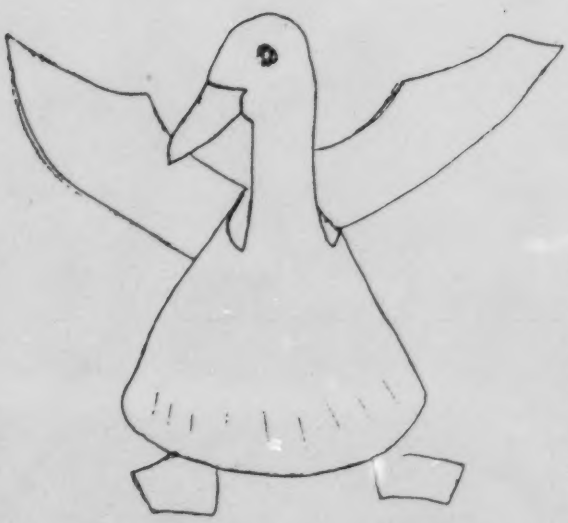
Plump Dove or Gull

Transfer two circles to paper plage. Draw in eye just above center point. Add beak and neck and cut along solid black lines. Discard light green area.

Circles for center actual size.







Saucy Goose

Transfer two circles to plate around centers shown. Draw in beak and eye; cut along solid black lines. Discard green-toned areas. Color beak and pieces marked "foot" a bright orange, then glue foot pieces to inside of body.

8. Literature. Share with the children one or more of the following poems. Children might like to illustrate one of the poems, either individually or as a class project.

"The Sea Gull"

I watched the pretty, white sea gull
come riding into town;
The waves came up when he came up,
Went down when he went down.

Leroy F. Jackson

If you find a little feather
A little white feather
A soft and tickly feather
It's for you
(a feather is a note from a bird)

And it says, "Think of me
do not forget me
Remember me - forever -
Or at least until the feather is lost."

So -
if you find a little feather,
a soft and tickly feather,
its for <u>you</u>!

Pick it up and put it in your pocket.

by: de Regnieis
from: "Something Special"

SEA GULL

Elizabeth Coatsworth

The sea gull curves his wings,
the sea gull turns his eyes.
Get down into the water, fish!
(if you are wise.)

The sea gull slants his wings,
the sea gull turns his head.
Get deep into the water, fish!
(or you'll be dead.)

from: Poems and Rhymes - Childcroft

9. Literature. Just for fun, read aloud to students one or more of the stories about water birds:

"Look at a Gull", Dare Wright

-actual photos of gulls, shows the hatching gull through adulthood
-very good for small children

"Thy Friend, Obadiah", Brinton Turkle

-a good story of how a sea gull adopts a little Quaker boy

"The Ugly Duckling", Hans Christian Andersen

"Barka, the Adventures of a Goose with No Feathers", John Birmingham

AT THE BEACH

Activity 1: Observing Birds

Before going to the shore, remind children to watch for birds and to see how many they can recognize. Follow-up by discussing this when you return to school. Find out who saw the birds and ask what the birds were doing.

If you can convince children to sit very, very still for a period of time, scatter bait on the beach: old bread, meat or fish scraps. Persuade the children to sit stone still and watch to see what birds come to the food and whether or not they eat it. Be sure to watch and discuss the behavior of the birds toward each other in the presence of the food. Do birds of the same species interact with each other? How? How do birds of different species react to each other?

Encourage children to be aware of bird tracks on the sand or mud. Help them observe the size of the tracks and whether or not they are webbed. See if they can figure out what kind of bird might have made the tracks and what it might have been doing.

BIBLIOGRAPHY

"Look at a Gull"
Dare Wright

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"Thy Friend, Obadiah"
Brinton Turkle

- a good story of how a sea gull adopts a little quaker boy!

"The Ugly Duckling"
Hans Christian Andersen

"Barka, the Adventures of a Goose with no Feathers"
John Birmingham

The Alaska State Museum has lots of Tlingit Raven stories. Check the Alaska Multimedia Education Program.

TEACHER INFORMATION
FOR
SEA WEEK CURRICULUM MATERIALS

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KINDERGARTEN

Name of Sea Week Materials	Contents and/or Use
ACTIVITY BOOK	30 pages of multi-use worksheets
Worksheet #1 - Seaweeds (Marine Algae)	Discuss various types of seaweed using this drawing.
Worksheet #2 - Holdfast	Discuss the suction cup properties of holdfasts.
Worksheet #3 - Bull Kelp	Pictures Bull Kelp-a common seaweed in Southeast Alaska.
Worksheet #4 - Matching	Circle or color the seaweeds that are exactly the same. (*Note that some are reversed.)
Worksheet #5 - Bull Kelp Maze	Draw a line from the kelp stalk to the snail on the kelp blade.
Worksheet #6 - Sea Lettuce	Discuss edible properties. Make sea lettuce salad. Cook sea lettuce.
Worksheet #7 - Count - Color	Count the seaweeds and put the number in the box.
Worksheet #8 - Color Code	Color the seaweeds by number.
Worksheet #9 - "S" Seaweed	Circle the pictures that start with "s".
Worksheet #10- 'Seaweed	Read poetry about the sea.
Worksheet #11- Crow	Discuss crows.
Worksheet #12- Raven	Discuss ravens.
Worksheet #13- Raven/Crow	Compare ravens and crows.
Worksheet #14- Bald Eagle	Discuss bald eagles.
Worksheet #15- Eagle	Print 'eagle'.
Worksheet #16 - Seagulls	Coloring Sheet

Name of Sea Week Materials (cont'd)	Contents and/or Use
Worksheet #17 - Seagull Maze	Draw a line from the seagull to the dead fish. Do not go over any lines or rocks.
Worksheet #18 - Match	Color or mark the birds that are facing the same direction as the labeled bird.
Worksheet #19 - Duck	Discuss ducks and print 'duck'.
Worksheet #20 - Geese	Discuss geese and print 'geese'.
Worksheet #21 - Bird Heads and Feet	Draw lines from the bird feet to the correct bird heads.
Worksheet #22 - Count-Color	Count the birds and put the number in the box.
Worksheet #23 - Feed the Octopus	Make a line from the mussel to the octopus' head.
Worksheet #24 - Bivalves/univalves	Discuss shell types and differences. Trace words.
Worksheet #25 - Sea Urchin	Discuss sea urchins and trace and print words.
Worksheet #26 - Hermit Crab	Discuss hermit crab and trace and print words.
Worksheet #27 - Anemone	Discuss anemones and print and trace words.
Worksheet #28 - Starfish	Discuss properties of starfish and trace and print words.
Worksheet #29 - Seal/Sea Lion	Compare and discuss. Trace words and print at the bottom.
Worksheet #30 - Humpback Whale/Killer Whale	Discuss and compare. Trace words

COLOR ILLUSTRATIONS

Sea Lion	15 x 17 ½ inches. Full color with plastic covering. *
Sea Otter	15 x 17 ½ inches Full color with plastic covering. *

Name of Sea Week Materials (cont'd)	Contents and/or Use

STUDY PRINTS (16x20 Color Enlargements)

2 - Canada Geese	*
2 - Raven	*
2 - Crow	*
2 - Bald Eagle	*
2 - Sea Gull	*
2 - Harlequin	*

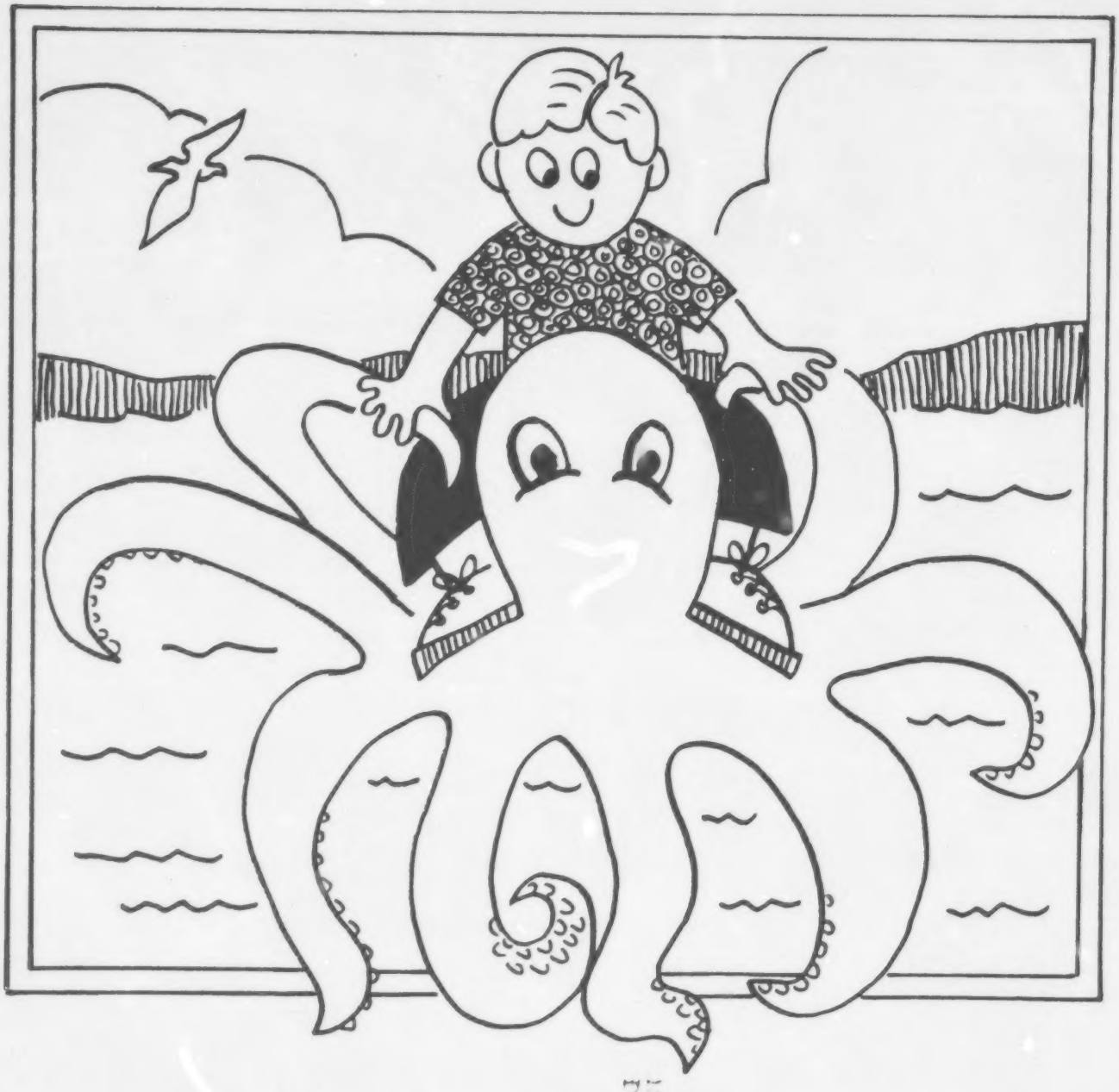
HANDS-ON-MATERIAL

2 - Sea Otter Pelts	*

Activity Book

For Kindergarten

Sea Week



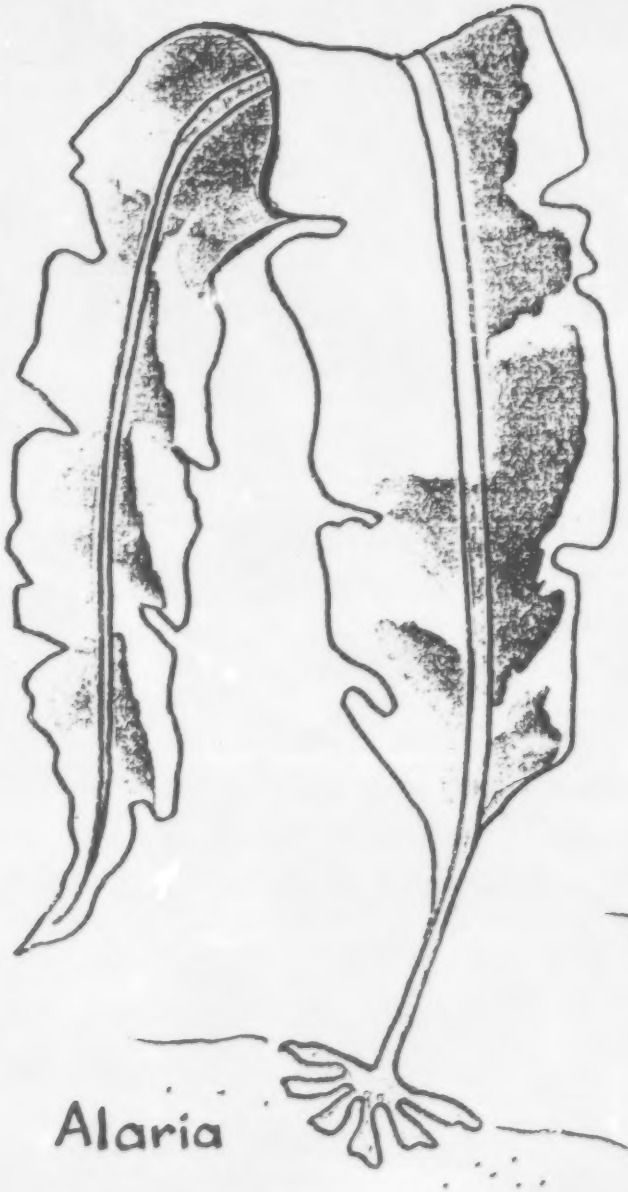
Kindergarten

Worksheet #1

SEAWEEDS

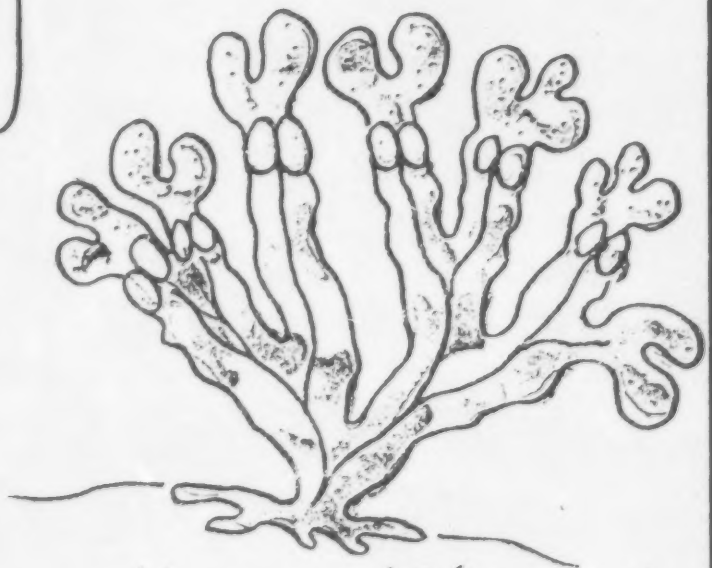
Virginia Eggert 1979

HOLDFAST



Alaria

Dulce



Rock-weed
(Fucus)

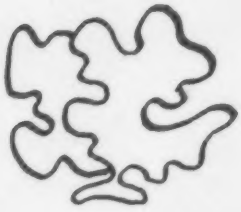
Bull Kelp

MATCHING

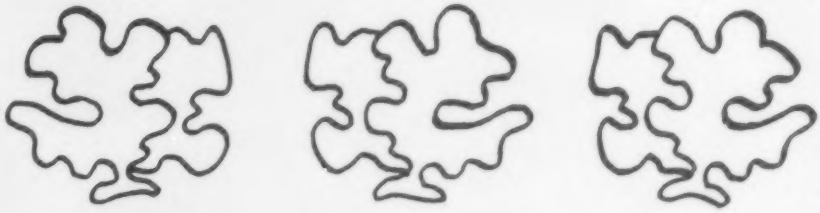
Directions: Circle or color the seaweeds that are exactly the same.

Bull Kelp

Fucus



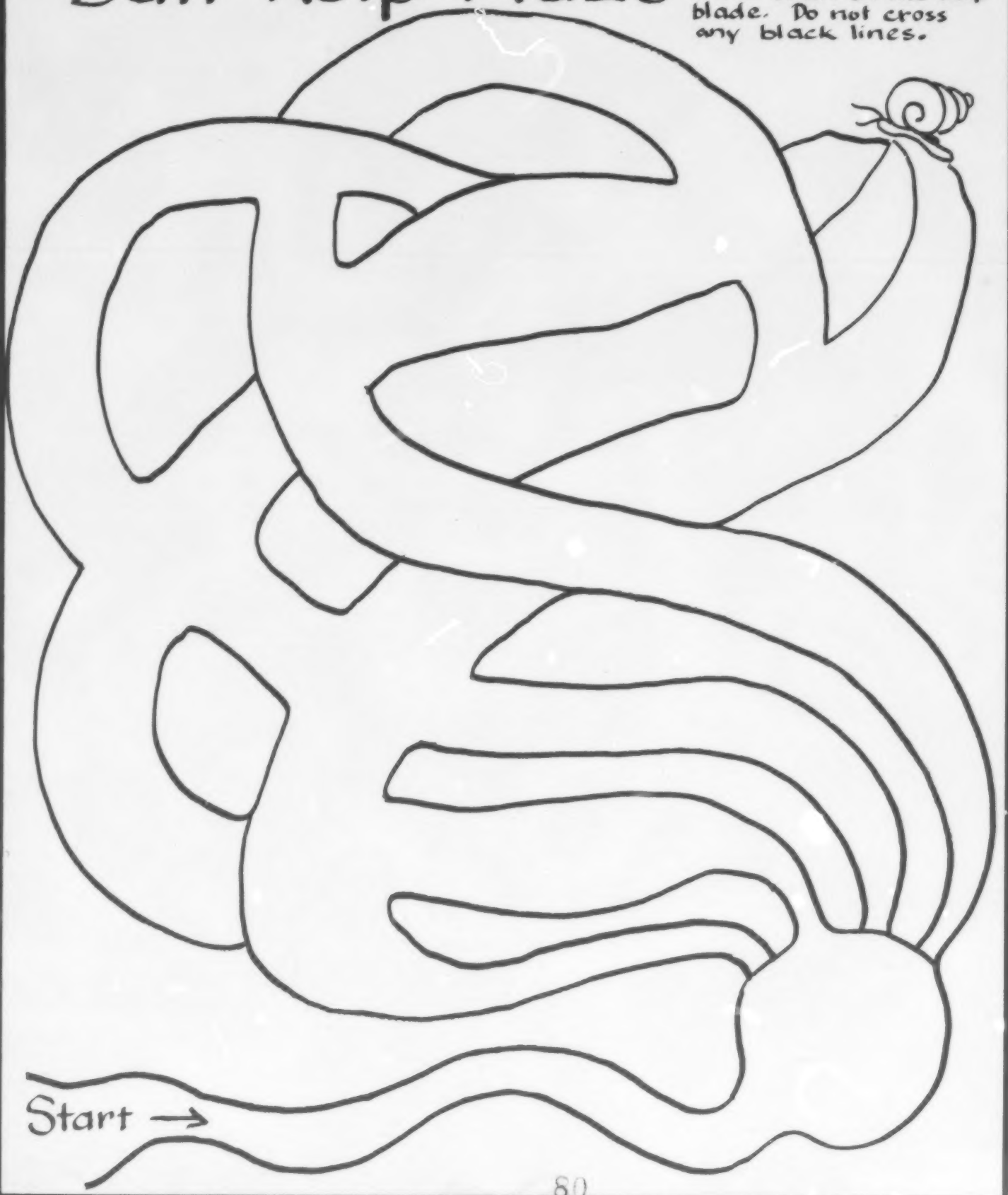
Sea Lettuce



Dulce

Bull Kelp Maze

Directions: Draw a line from the kelp stalk to the snail on the kelp blade. Do not cross any black lines.



sea lettuce

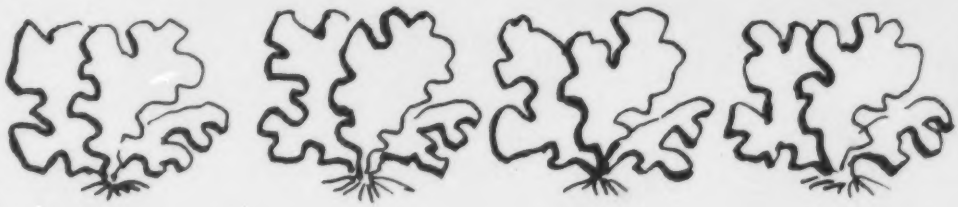
COUNT-COLOR

3

Bulb Kelp

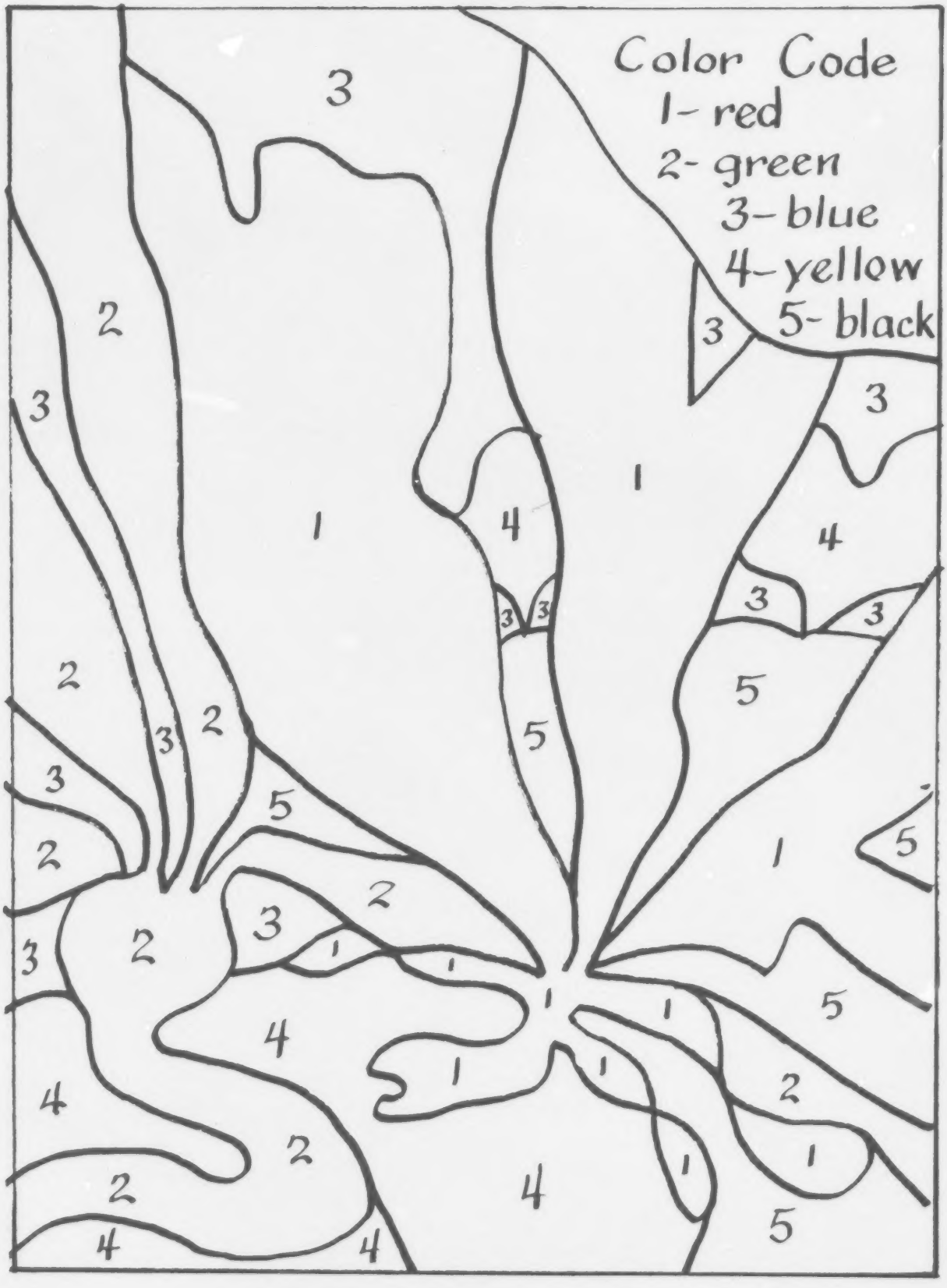
Rockweed

Sea Lettuce



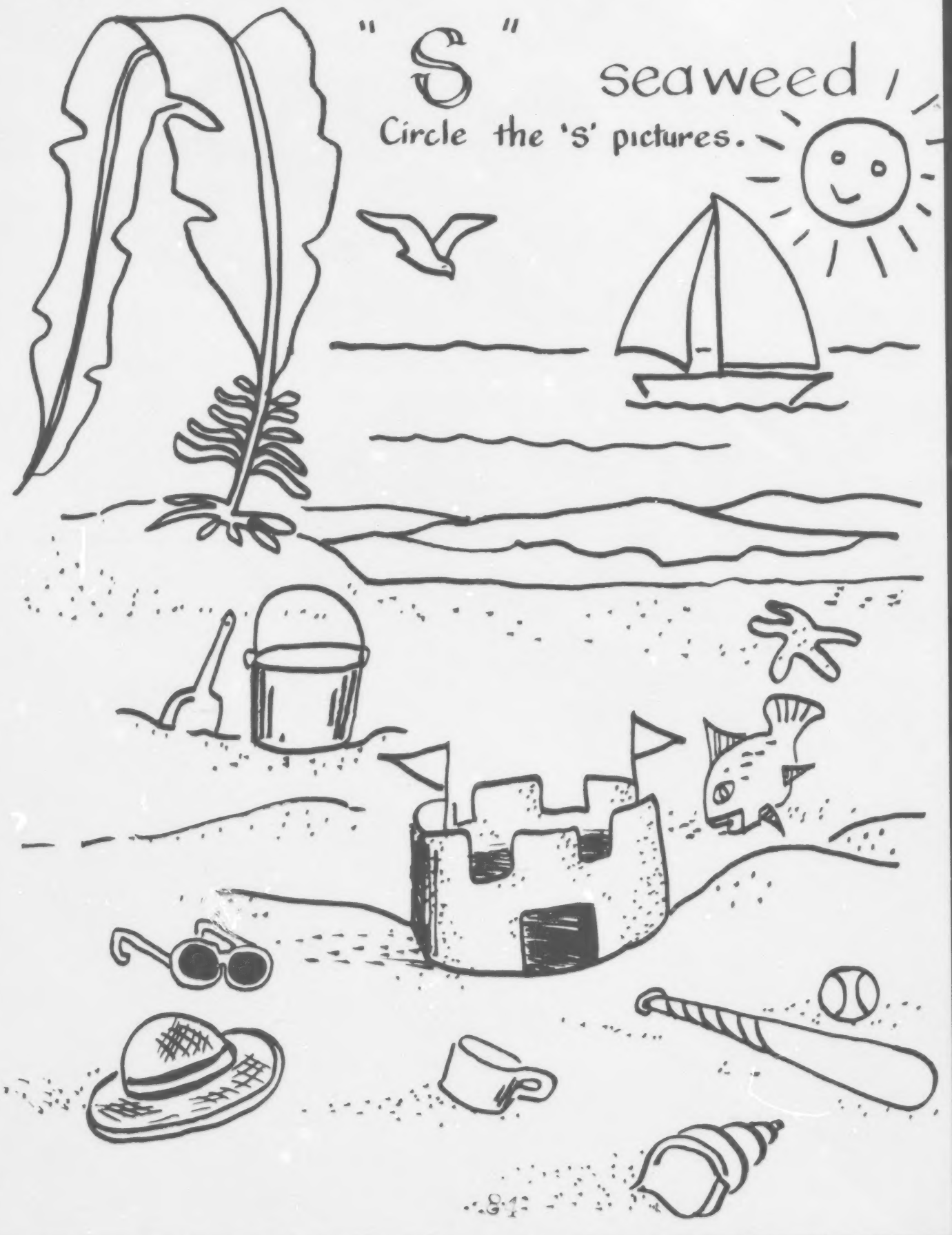
Alaria

Dulse

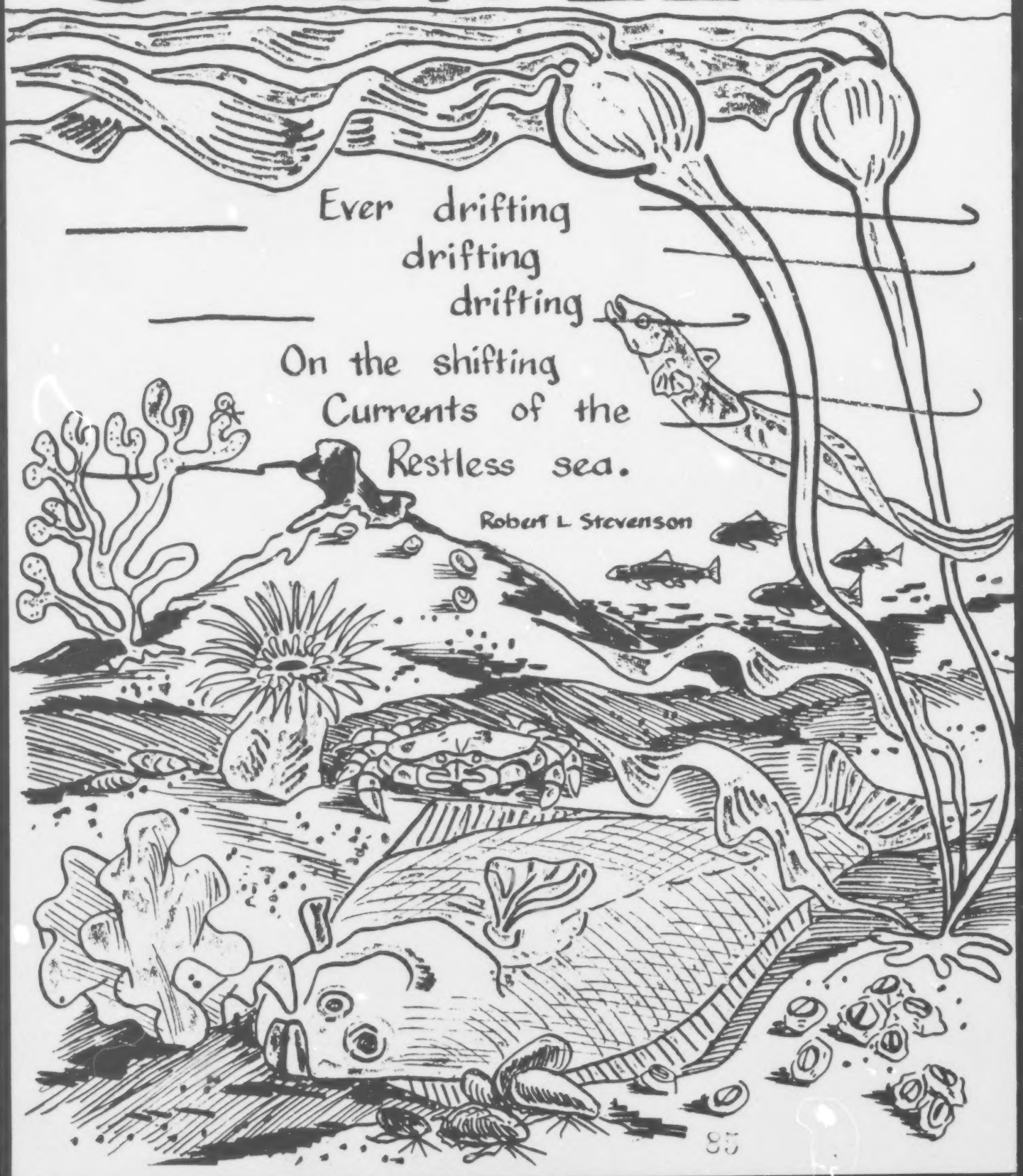

Color Code
1- red
2- green
3- blue
4- yellow
5- black

" S " seaweed

Circle the 's' pictures.



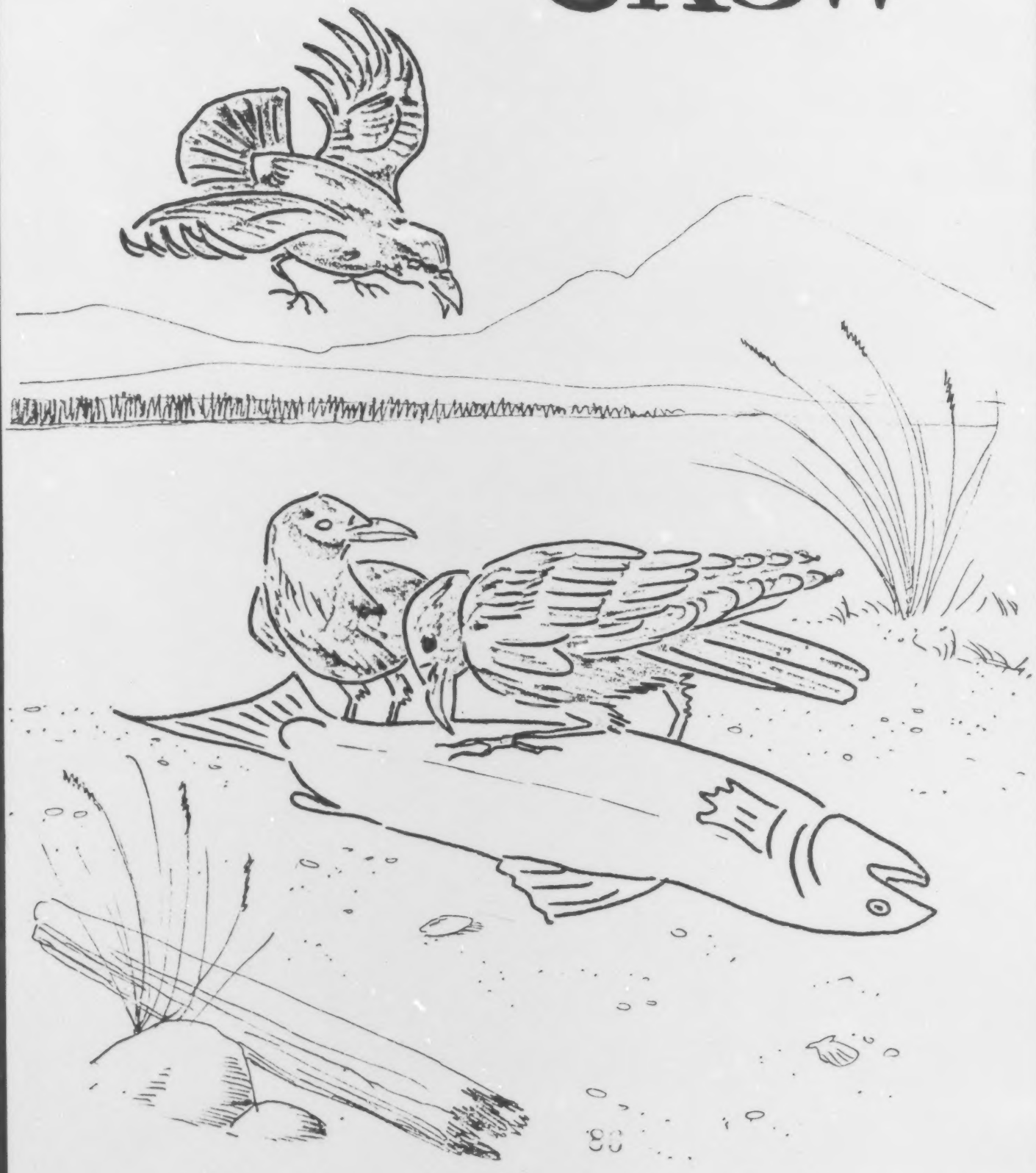
'SEAWEED'



Ever drifting
drifting
drifting
On the shifting
Currents of the
Restless sea.

Robert L Stevenson

CROW



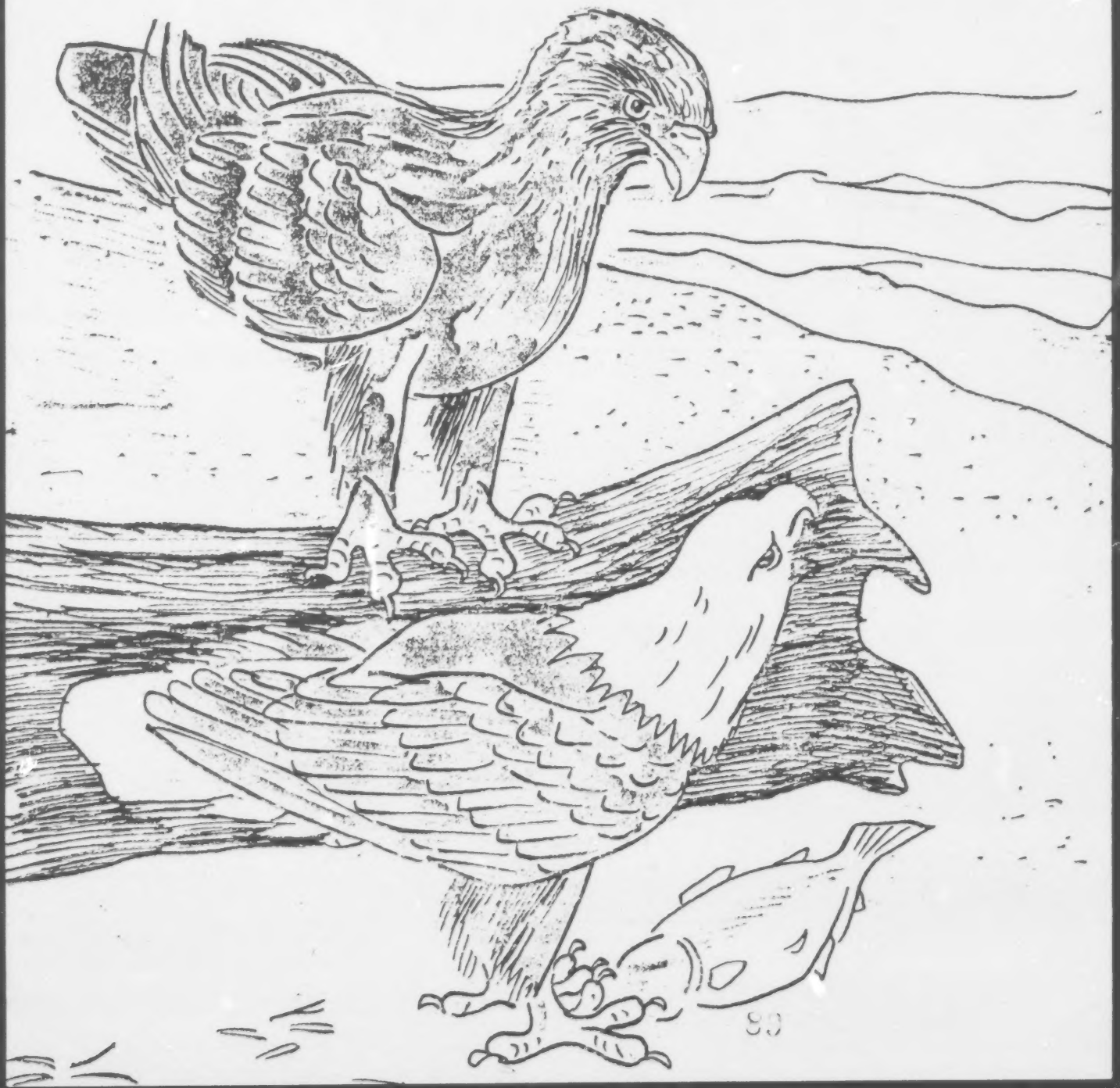
Raven

Raven

Crow

Name: _____

bald eagle



eagle

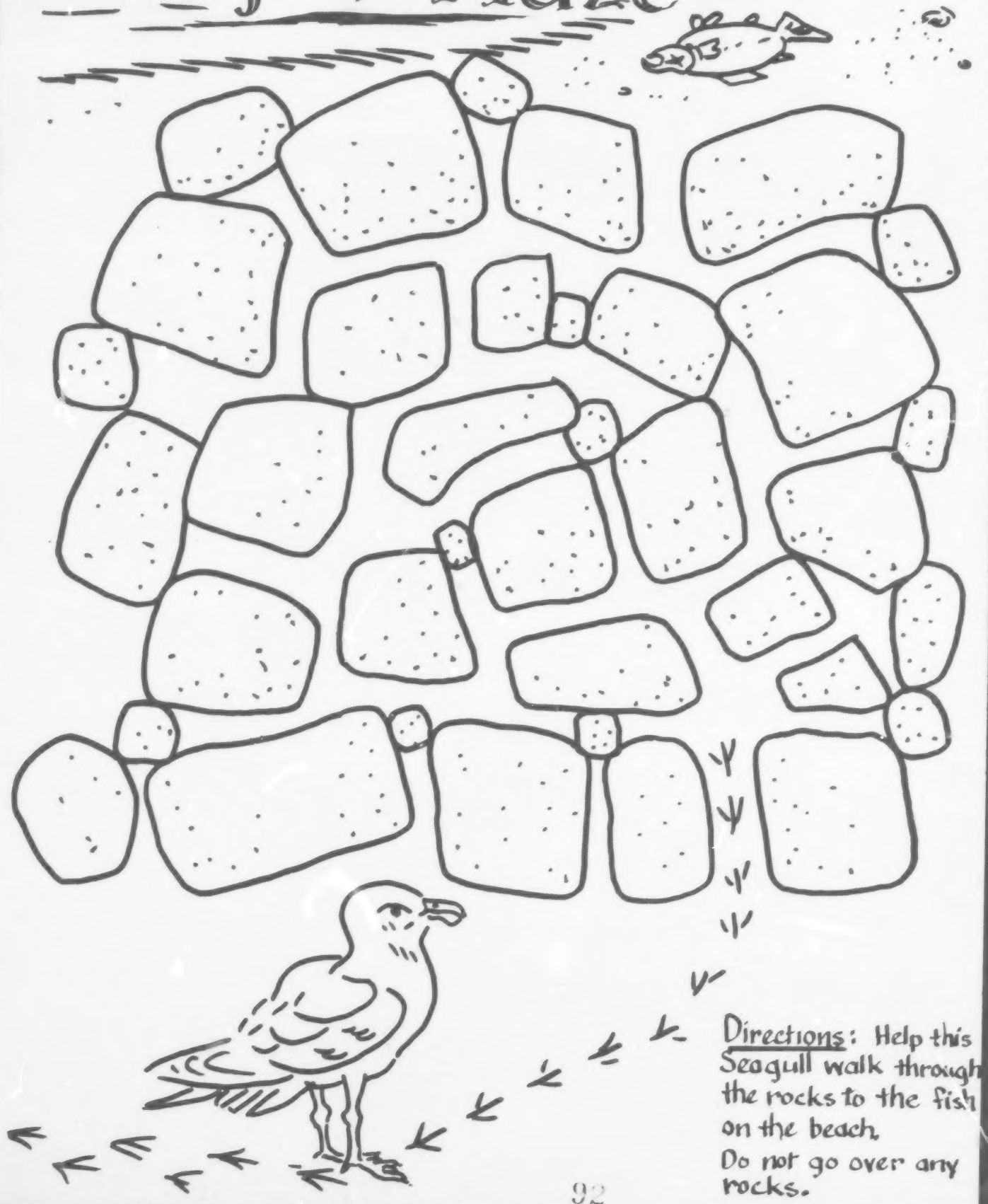
Kindergarten ©

Worksheet #16

SEAGULLS

Worksheet #17

Seagull Maze



Directions: Help this Seagull walk through the rocks to the fish on the beach.
Do not go over any rocks.

Kindergarten ©

Worksheet #18

Match

Directions:
Color or mark the birds facing the same direction

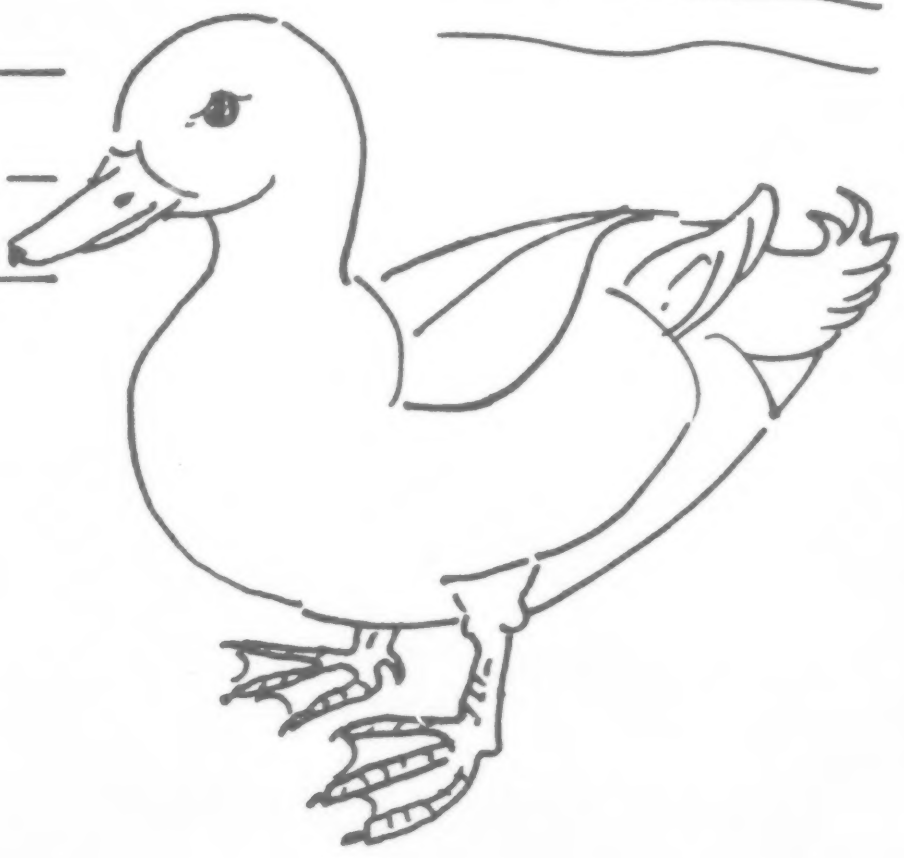
Crow

Raven

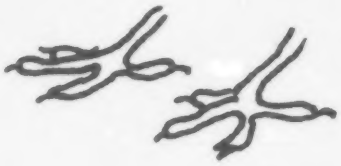
Eagle

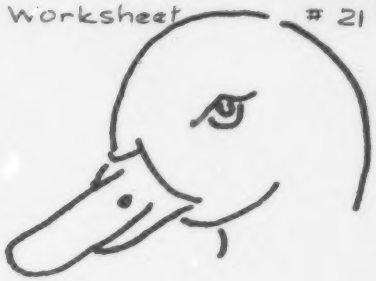
Seagull

duck



GEESE

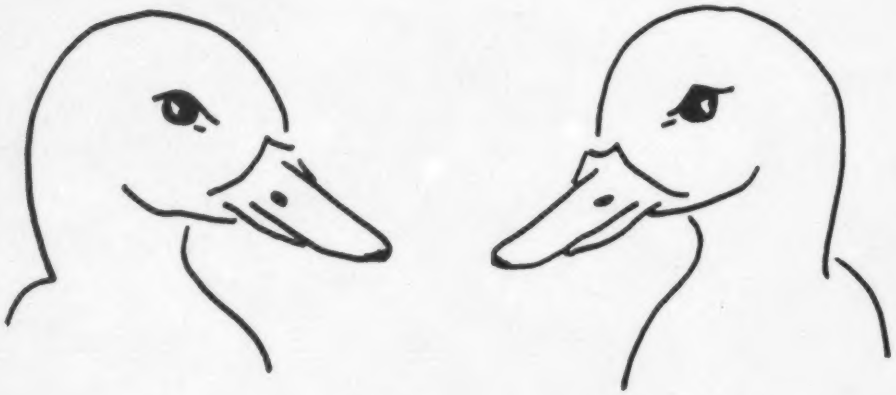




Directions: Draw lines from the bird feet to the correct bird head.

Count-Color

Canada Geese



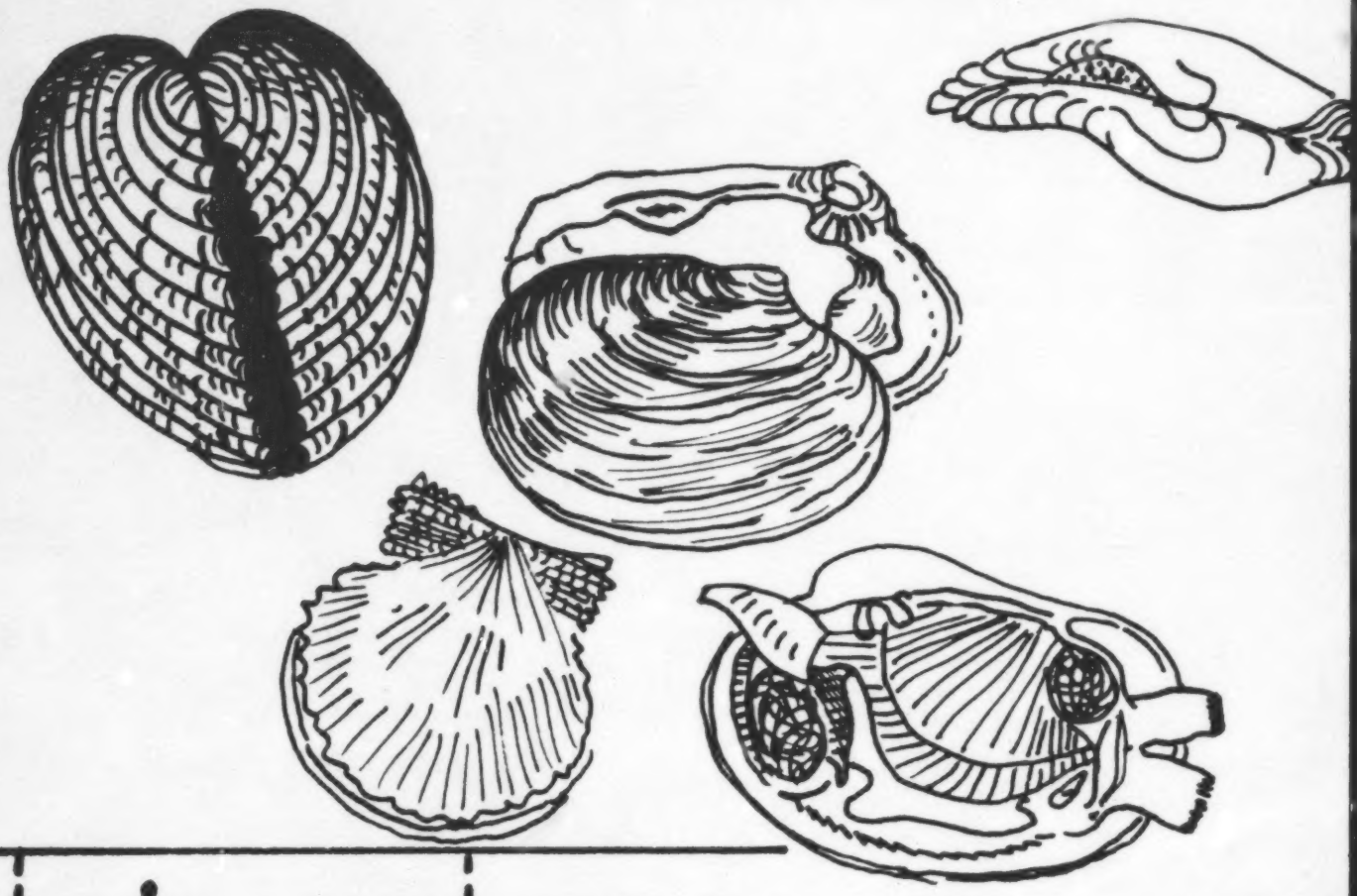
Ducks

Crow

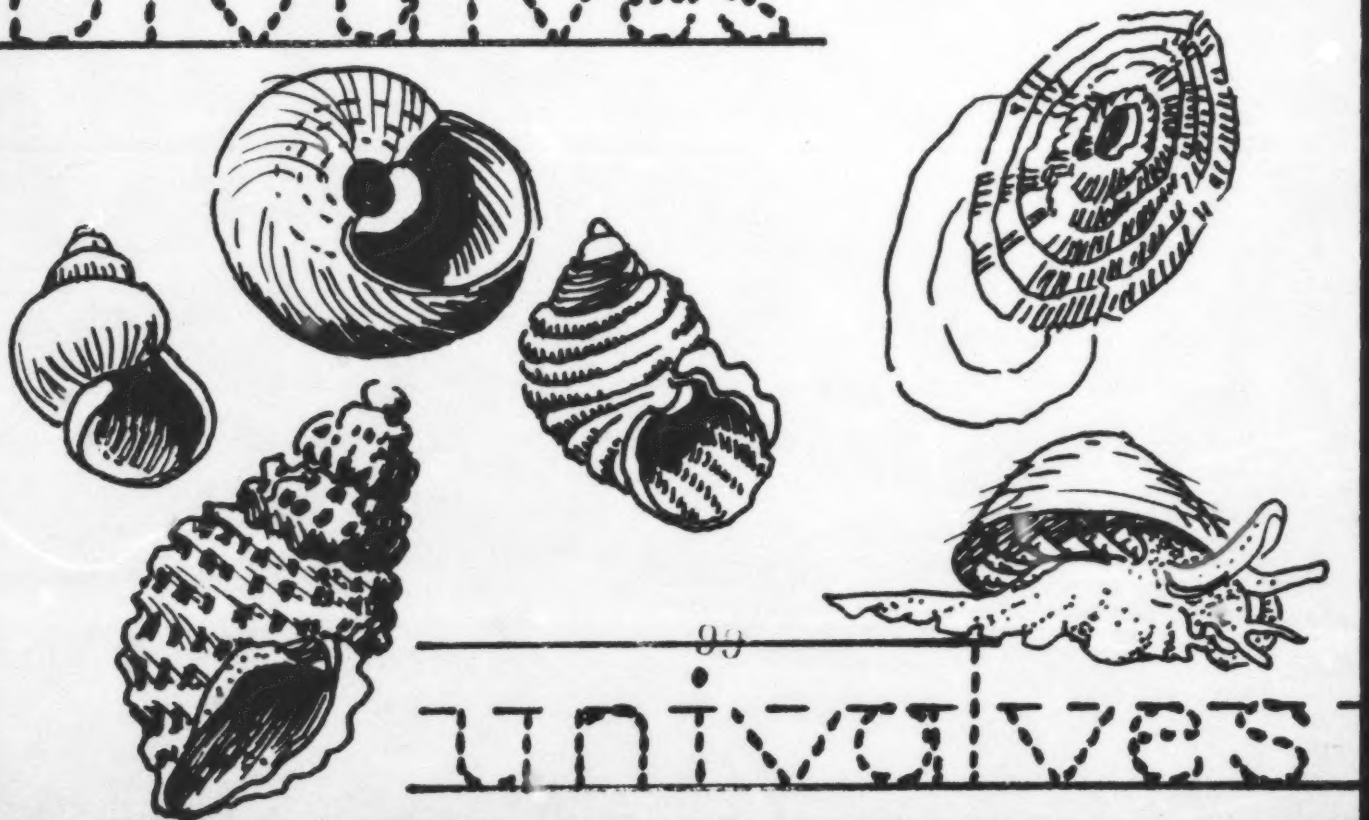
Seagulls

Feed the Octopus!

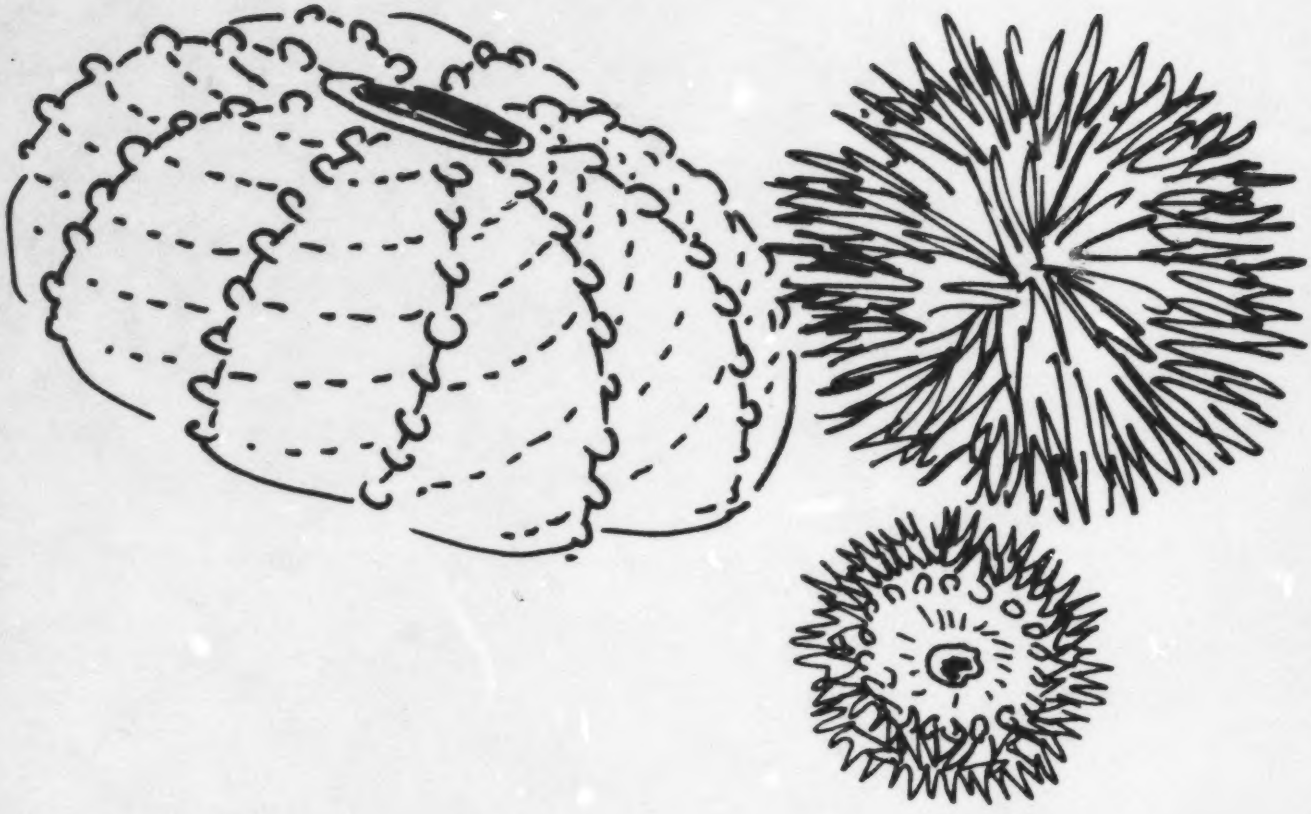
Make a line from the mussel shell to the Octopus' head. Do not cross any black lines.



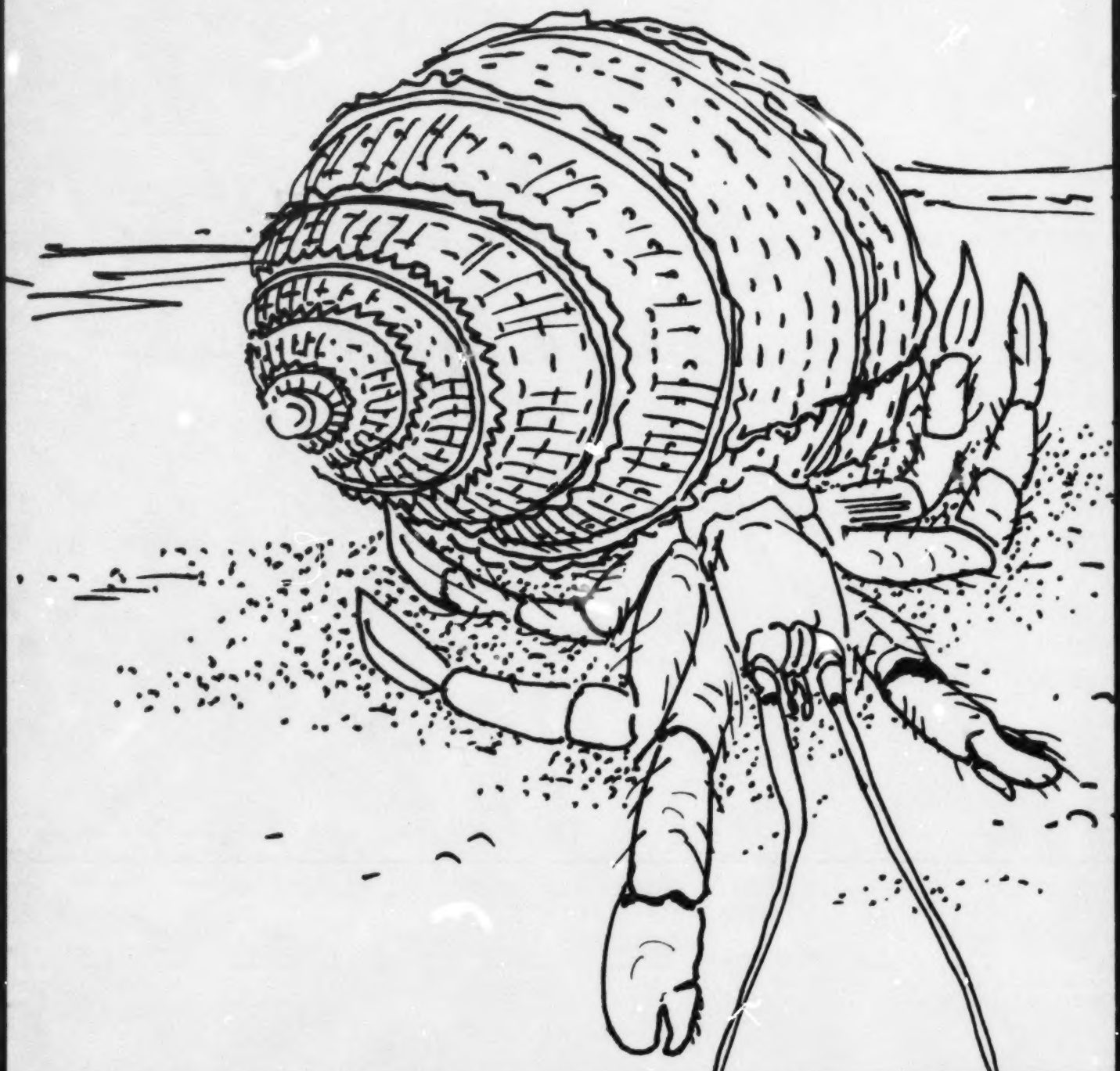
bivalves



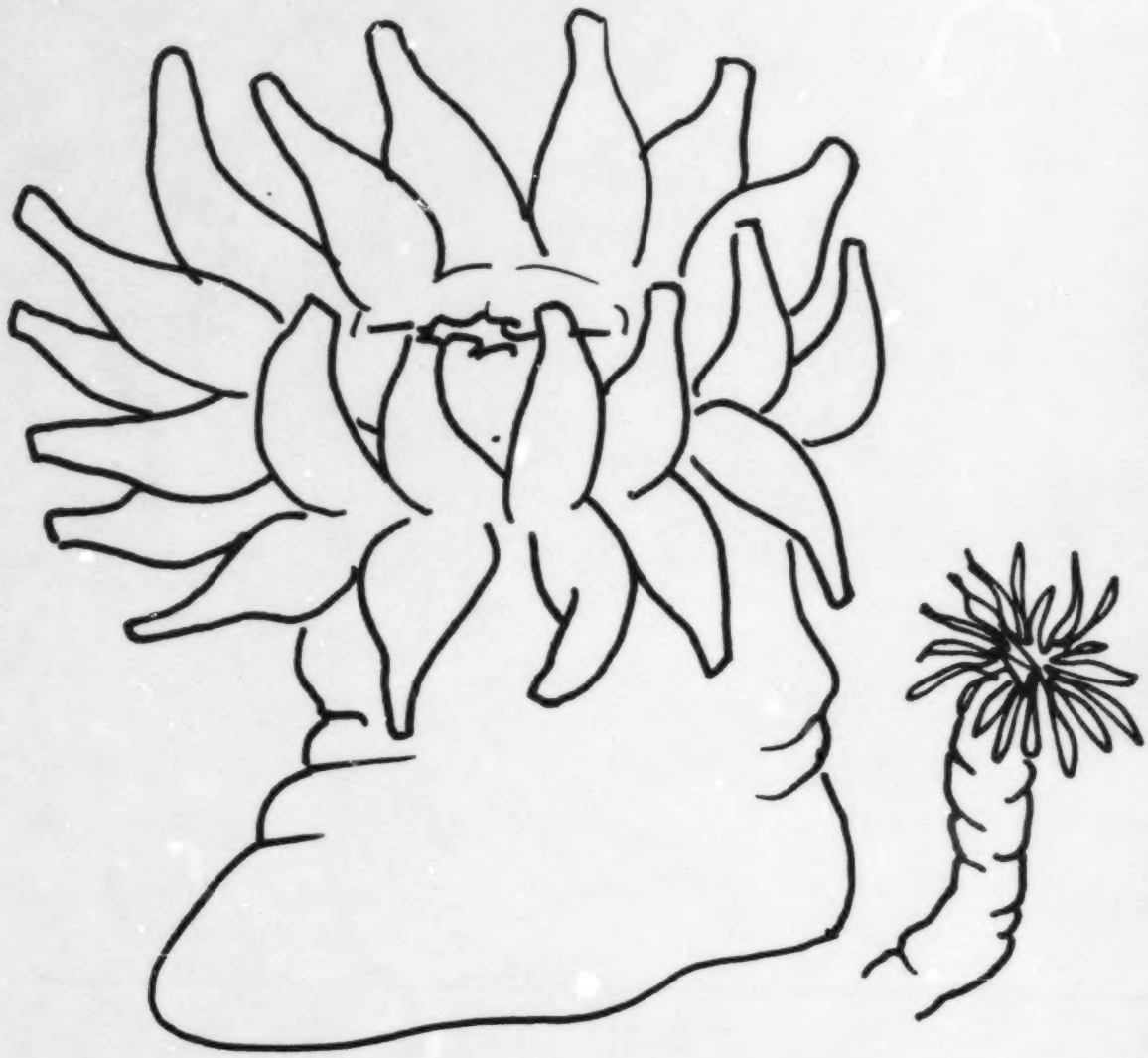
univalves



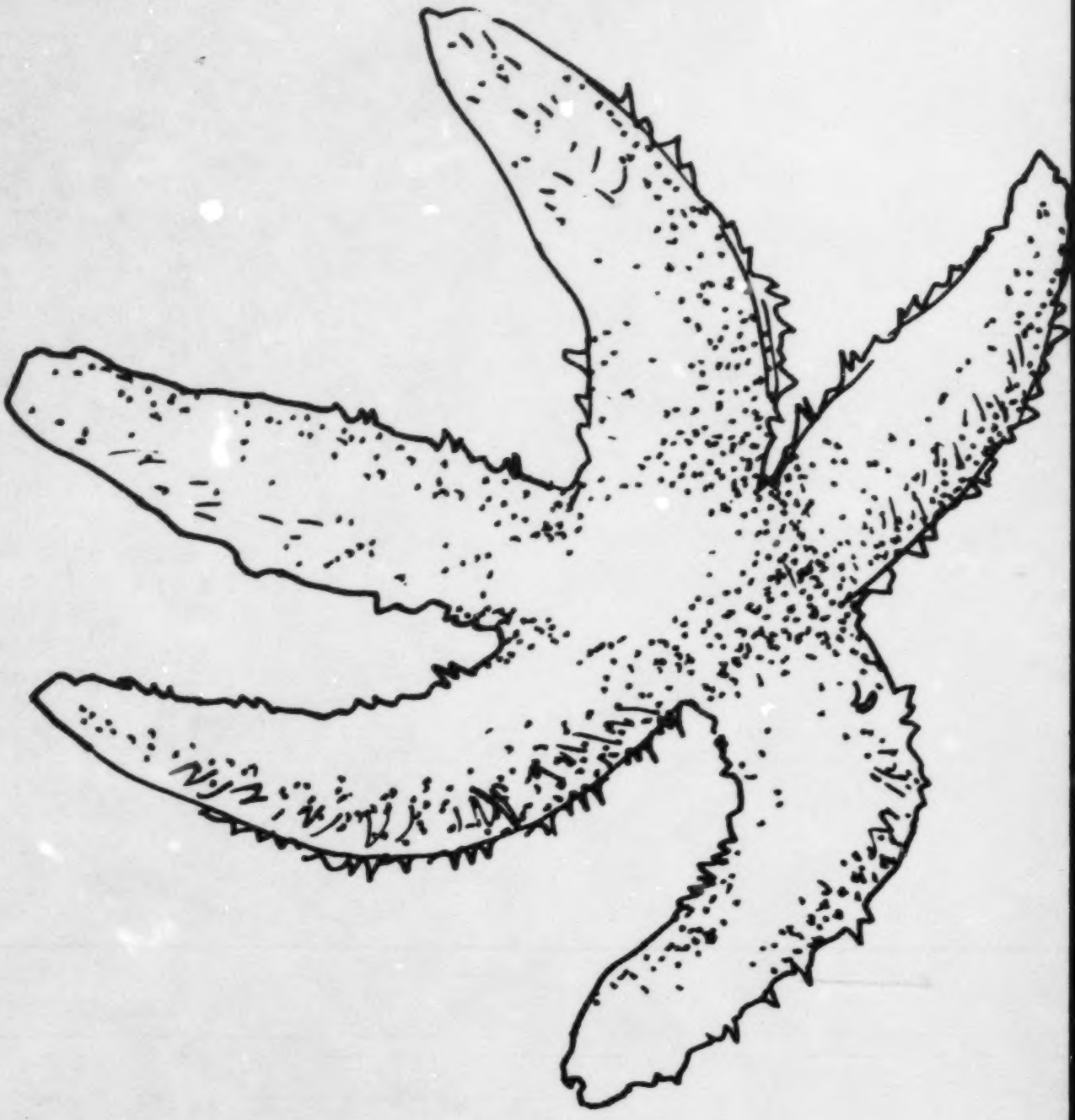
Seeigel



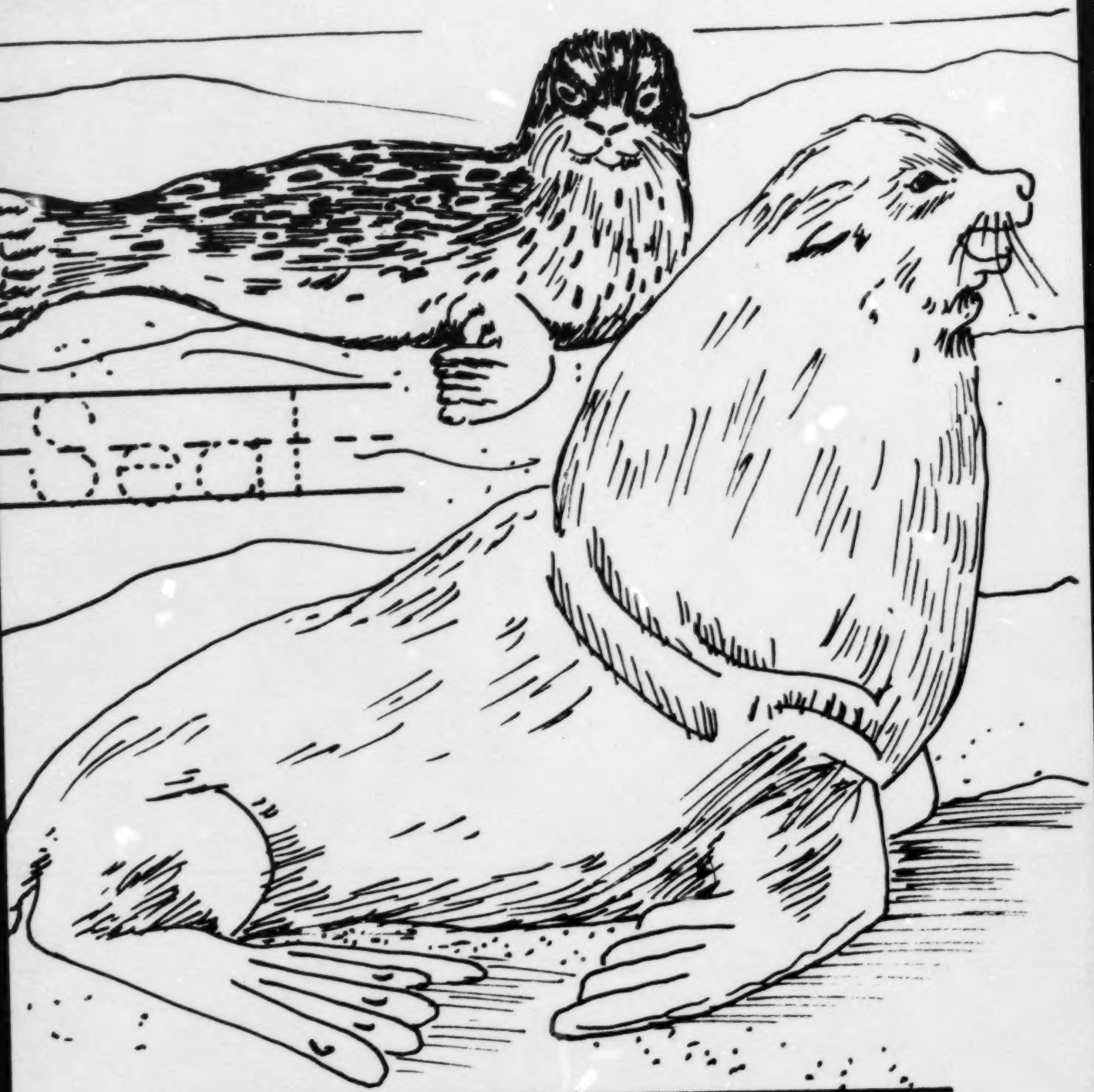
hermit crab



Anemone



starfish



seal

seal

Kindergarten ©
humpback whale
killer whale
worksheet #30
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STEPS TO ORGANIZING A SEA WEEK IN YOUR COMMUNITY

I. Familiarize yourself with the Sea Week curriculum and introduce it to other interested teachers and parents.

II. Catalog the resources in your area. Where are the good beaches? When are the good low tides? Are there any agency, hatchery, or museum personnel that would be available as speakers and/or for field trips?

III. Draw up a well-thought out plan for Sea Week and present it to your administrators for approval.

IV. Talk to teachers in the upper grades about having some of their students accompany you on your field trips. Brief them ahead of time as to the activities you'll be doing.

V. Make up a calendar of when speakers will talk, which movies will be shown, and when each class will take their field trips. By arranging two field trips near one another in location, or by having the second class come to the beach when the first field trip of the day is leaving, gas (and energy) can be saved by having fewer bus trips.

VI. Invite the whole community to participate - parents, chamber of commerce, governmental agencies, native corporations, fishermen, etc. Parents can assist with field trips; businesses might display student artwork. If community organizations are interested, the week can become a Festival of the Sea, with boat tours, movies, speakers, games, and dances. Contact your local paper about featuring Sea Week with a photo and story - beforehand, during, and afterwards! Radio stations might want to interview field trip leaders - or read stories that students have written.

VII. Spend an entire week studying the amazing ocean! Math problems, writing assignments, spelling words - can all relate to our marine environment. Show your students the wonder of sea life!

SUGGESTED FIELD TRIPS

In planning field trips for your class two things should be considered: 1. The emphasis in Sea Week studies at your grade level. 2. The available community resources.

Consider visiting a place - beaches, docks, vessels (fishing, pleasure, ferry, barge, tour ship, Coast Guard), cold storage plant, canneries, supermarket, government research facilities, hatcheries. Museums, private collections and stores might be considered for indoor trips. Arrangements might be made to watch someone at work - fisherman, biologist, or Coast Guard personnel. If your students have an opportunity to visit another community you might include Sea Week activities in your itinerary or might include the entire trip around them.

In planning any trip, if possible arrange for knowledgeable persons to accompany your group. The involvement of interested parents is also valuable.

KINDERGARTEN

I. Marine Mammals

A. Seashore - at a time when marine mammals are known to be in the area.
B. Museums, stores, or homes - where student can observe or touch mounted animals, pictures, pelts, bones, or clothing made from marine mammal pelts or where they can listen to stories about these animals.

II. Other Study Topics

A. In the study guide, shore activities are recommended in each unit. Some of these might be combined, or a number of beach trips might be taken.

WHAT TO DO ON THE BUS

Put together a checklist of objects (or use the one that follows) that the students may see at the beach. During the bus ride, students can circle the name (or picture) of each object that they think they will be seeing during the field trip. At the beach, they can check off the objects they actually saw, and estimate or count how many they saw. A Juneau teacher makes her checklists into a small book, with a pencil attached by yarn, and gives each pupil a sandwich bag in which to store his/her checklist.

bus	_____	cow	_____
can	_____	raven	_____
fish	_____	sheep	_____
tree	_____	driftwood	_____
gull	_____	boat	_____
buoy	_____	moose	_____
anemone	_____	dock	_____
whale	_____	starfish	_____
seaweed	_____	house	_____
crab	_____	airplane	_____
bottle	_____	fisherman	_____
jellyfish	_____	limpet shell	_____
sand flea	_____	sea urchin	_____
mussel	_____	porpoise	_____

CONSERVATION

Conservation may be defined as the "wise use" of our natural resources. It is not the non-use of them, but rather a use that comes after careful thought has been given to the reasons and consequences of that use.

It is perhaps trite to say that with increasing population pressures, the ever-increasing need for raw materials, for recreational facilities, for homesites, etc., pressures increase on a natural environment that may previously have been untrammeled and in no need of someone to protect it from total alteration. Here in Alaska, particularily, the residents of the State are faced with making many immediate far-reaching decisions about the natural environment of our State. What man's impact on it will be and if and how that impact should be limited or controlled are some of these decisions.

Conservation, practically, comes down to a few important principles:

1. Every living thing, as well as non-living thing, has a place and function in the balance of existence on the surface of this planet, whether or not we happen to know what its precise niche is. "Everything is connected with everything else." "Everything affects everything else." Destruction of one species, useless and unimportant though that species may seem to our ignorance, can have wide-reaching repercussions.

2. Natural resources are exhaustible. Populations which drop below a critical threshold cease to reproduce and the species plummets into extinction. Energy resources on earth are not renewable. Extinction of living species and exhaustion of non-living resources are natural processes. Trilobites went extinct before men appeared on the scene. Volcanoes spew noxious gases into the air. Nevertheless, the speed with which man, especially 20th century man, is destroying or using up extant life and resources is astronomical compared to natural processes.

3. Since man is an intelligent being, he can, if he will, desist from extinguishing life and exhausting the resources of the earth. Man can practice conservation without denying himself a full and enjoyable life. His reason for using resources wisely may be an idealistic appreciation of all that nature has and is, or it may be a realization that our tomorrows will be poorer unless wisdom regulates usage of our goods.[1]

For school children studying Alaska's marine life, conservation involves a few simple, yet extremely important principals:

1. DO VISIT THE BEACH AND ENJOY YOUR TIME THERE BUT WHEN YOU LEAVE, LET THE AREA BE THE SAME, OR BETTER, THAN YOU FOUND IT.

2. IF YOU TURN OVER A ROCK TO SEE WHAT IS HIDING UNDER IT, TURN IT BACK OVER WHEN YOU HAVE FINISHED. (What lives there may depend for survival on the exact kind of micro-habitat that exists under that rock.)

[1] Reef and Shore. Hawaii Nature Study Program for Elementary School Children, p. 4.

3. IF YOU PICK UP ANIMALS FOR CLOSER VIEWING, DISTURB ONLY THE ONES YOU WANT TO LOOK AT, HANDLE THEM CAREFULLY, THEN REPLACE THEM WHERE YOU FOUND THEM. SEA CREATURES CAN LIVE OUTSIDE OF THE WATER ONLY BRIEFLY. A PAN OR BUCKET OF SEAWATER WILL ALLOW CLOSER EXAMINATION AND REDUCE STRESS ON THE ANIMAL. KEEP THE CONTAINER OUT CF DIRECT SUNLIGHT AND REPLACE THE WATER IF IT BEGINS TO WARM. HANDLE FISH WITH WET HANDS TO PRESERVE THEIR PROTECTIVE SLIME AND IN HANDLING CRABS AND JELLYFISH - WATCH OUT FOR STINGERS AND PINCHERS. PICK CRABS UP FROM THE BACK AND SUPPORT THEIR UNDERSIDE WITH THE PALM OF YOUR HAND. DON'T TOUCH JELLYFISH.

4. IF YOU WANT TO USE LIVE MATERIALS IN THE CLASSROOM AFTER THE FIELD TRIP TO THE BEACH, TAKE ONLY WHAT YOU WILL NEED, TAKE CARE TO KEEP IT ALIVE, AND RETURN IT TO THE BEACH WHEN YOU ARE FINISHED WITH IT.

5. NON-LIVING BEACH MATERIALS MAY BE COLLECTED BUT USE MODERATION HERE, TOO. IF MATERIALS ARE FOR CLASS USE, HAVE A PROJECT IN MIND BEFORE YOU BEGIN COLLECTING AND THEN GATHER ONLY WHAT YOU WILL NEED. YOU MAY WANT TO GATHER DRIFTWOOD, STONES, BITS OF POLISHED GLASS. UNLESS YOU ARE A SECOND GRADE TEACHER, HOWEVER, PLEASE COLLECT ONLY A FEW, IF ANY, EMPLY SHELLS LEAVING THESE MATERIALS FOR THE SECOND GRADERS WHOSE ONLY SEA WEEK BEACH AND CLASSROOM ACTIVITY IS STUDYING THEM.

Appendix V

A CHECK LIST

FOR

A FIELD TRIP TO THE BEACH

You the teacher:

1. Be sure you are personally familiar with the beach to which you and your class are going. If you have not been there before, take a bit of time after school or on the weekend to go to that beach and walk it carefully. By being familiar with it yourself, you can anticipate what your students will be able to see and do there.

2. Check carefully on all bus arrangements for your class. Be sure that a bus is scheduled for you and be aware of the delivery and pick-up times.

3. Arrange for adequate adult supervision. Usually there is no problem in finding parents willing to go along. Often junior or senior high school students may also be available and, if they are taking biology or other related science courses, they can be very helpful. One older student or adult for every five or six children would be a good ratio in terms of safety, control, and learning.

4. Give careful thought to what you will do with your time at the beach. The beach is an exciting place just to explore, but some thought and directions given to the activities to take place will make the experience richer and more profitable for students and you, too.

5. Meet - or at least talk by phone - with your volunteers before the field trip to acquaint them with your plans for the outing. Be sure that each of them knows specifically what you would like each to do. Recommend that they attend appropriate training workshops and provide them with information from this guide or elsewhere.

6. Well in advance of the beach trip itself, begin preparing your students for their experiences there. The better prepared they are, the more successful the field trip will be.

7. Letters should be written to all parents, including permission slips, so that parents know about the activities in which their children will be involved.

8. Collect and ready all materials you will need for the field trip - buckets, pans, binoculars, camera, whatever it is you need. You might consider bringing or arranging for some kind of snack at the beach - a big bag of gorp (M & M's, raisins, salted peanuts, etc.) always makes a hit and a snack can serve

to reorganize matters at the beach and create a natural (though slightly contrived) change of pace and focus. (see the suggested time plan that follows.) Be sure to take along a supply of bandaids - or better yet, a small first-aid kit - just in case there is a need for it.

9. Plan the trip ahead, but allow for flexibility. If a whale is breaching just off shore while you are trying to teach the life and ways of a barnacle, your students will not be absorbing much of your lecture. Be prepared to take advantage of those special events that occur so often along our shores.

The students:

1. Involve them in preparing for the field trip as much as possible.

2. Explain to them any rules for field trip conduct. Stress especially the fact that the beach is a special environment and a fragile one whose beauty comes from the LIVING plants and animals to be found there. Impress upon them the need to respect the life forms they will see, to leave the beach as nearly like they find it as possible and not to collect or molest live beach animals unless you, the teacher, have very specific and well thought out needs for limited quantities of live animals and materials for use in further teaching processes and have requested the students help you gather materials.

3. A quick talk about safety at the beach would not be out of place - the need for proper clothing, care to be taken on rocks that are slippery when wet, what to do in case of injury, always keep an eye on the tide to be sure you are not stranded or lose gear to the rising waters, etc.

4. If a class project is planned for the beach time, help students to prepare or gather materials they will need to take with them.

BOTH teacher and students:

BE PROPERLY DRESSED. It is always difficult to predict what the weather will be in coastal Alaska but there is often a good chance that there may be rain. Be sure everyone knows that he or she should come dressed warmly and prepared for rain if that prospect seems at all likely. Wearing layers of clothes always makes sense - a short sleeved shirt, then something with long sleeves, topped by a sweater or warm jacket and something water and wind-proof. Foot gear is important. Layer socks for maximum warmth and wear RUBBER boots if possible. Carrying a back pack is a good idea for students and teachers alike. It leaves your hands free, lets you store away layers of clothes you want to shed or don't need at the moment and is a good place to keep the snack you and/or the students have decided to bring along.

Appendix VI

SUGGESTED ON-SITE ORGANIZATION

The beach is an exciting place on your first visit there or your five hundredth and the most normal and natural thing to do on the beach is to walk - or run - along the shoreline to see what is there for the finding. If your class has been working hard on sea related studies and has carefully outlined what they want to do with their time at the beach, then perhaps all students will set right to work with whatever tasks have been outlined beforehand. But, if a less structured approach seems to be in order, you might try the following idea...

Part I

If, before the beach experience, you have been working in the classroom with the students on the particular area of marine knowledge outlined for your grade level, then the students should have a good idea of particular concepts or kinds of life or situations they might look for at the beach. Students could have the first half of the time at the beach to apply their knowledge in a free kind of framework. That is, for example, if you are a second grade teacher and have been studying shells with your students, give them the first part of their time at the beach to see how many different kinds of shells they can count, or give them some other similar kind of task that they can carry out and at the same time still be free to explore other aspects of the beach.

Part II

At the mid-point of your allotted time at the beach, gather the children together. Taking a bit of time out to open that big bag of gorp, or gathering for some other kind of snacking, works to draw everyone together, change the pace and focus.

After the quick energy break is a good time to have the students sit down quietly and talk about what they have seen or to have adult helpers work in small groups with children to share further discoveries or knowledge about materials found on the beach. As an example, if you are a first grade teacher who has been studying marine animals with your class, each adult helper might have been assigned to gather in a bucket - with the children's help - examples of a particular group of animals during the first part of the time on the beach. Then, during the second half of the beach time, each adult and his or her bucket of materials might circulate from one small group of children to the next, encouraging them to touch, feel, observe certain characteristics or qualities of these particular animals.

Children need both to enjoy the beach just for the pleasure there is in being there and to grow in understanding the complex web of life and environmental factors that are at work there. If careful thought and planning have gone on well before the actual trip to the beach, there is every reason to believe that both these goals can be accomplished.

A LOOK AT THE BEACH

Any beach is as individual in its own way as are we who, as individuals can be distinguished from all other people. Just as each of us represents only one combination out of the many possible, so it is with beaches. A beach is a place where the sea confronts the land, and every aspect of that sea and that land edge is important in determining what the general appearance of that beach will be and what kinds of plants and animals will grow and thrive in that particular environment. Many factors combine to determine the personality of that unique and special place.

The Sea

If we think first about the water at the beach, we realize that there are several ways in which it can vary. To begin with, for example, those of us living in the Juneau area look out to waters that are relatively protected. That is, our beaches are not subjected to the open, powerful swells that are common on coast lines that abut the open ocean. Unlike conditions that might be found at Sitka, for example, the wave conditions along our beaches are always relatively mild and non-violent. Even in the Juneau area, however, local differences in topography influence the personality of the beach. Whether a particular beach area is a straight, uninterrupted stretch, a deep or shallow cover, or a jutting point will influence the force and effect of the waves upon the shore. Consequently, we might expect to find different kinds of life on a point, in a cove, or on a straight, uncomplicated shoreline because each species has a particular ability to withstand greater or lesser wave force.

We all know that the sea is salty but we may not all realize that the concentration of salt in sea water can be highly variable. In the open ocean, salt concentrations measure about 32 to 33 parts per thousand. In our inside waters around Juneau, the average salt concentration in main channels may be slightly less than that because of the greater influence of fresh water entering from streams and rivers. At the mouths of the streams and rivers themselves, where salt and freshwater mix, salt concentrations are very low. Because each kind of marine plant or animal has its own built-in tolerances to varying saltiness or freshness, these living populations vary with the salinity prevalent at a particular place.

THE SIZE OF PEBBLES

If you stand on a beach and look thoughtfully at it, one of the first things you will notice is its texture - whether it it sandy, gravelly, composed of cobbles, bedrock, mud or a combination of two or more of these. The nature of the beach is critical in determining what can live there. Let's examine each kind of substrate in turn to see what kind of life we might expect to find.

Mud

Mud can be anything from relatively porous sand-soil mix to the clay muck that sucks rubber boots right off your feet. If you look at the surface of this kind of substrate, you will be aware of little, if any, life. Here and there you may see the flexible tubes of mud dwelling worms sticking up an inch or so above the surface. Or you may see "cake decorations" left by other burrowing worms. Finally, you may be aware of the presence of clams by the squirts of water and the siphon holes in the mud. Digging with a shovel will reveal the various inhabitants of the mud in all their glory - fat, bulbous peanut worms: slender, earthworm-like nemerteans of various descriptions; many-legged annelid worms; and hardy bivalves.

Sand

Because sand is more porous than mud, it is a better surface for many burrowers, a better surface for a wider number of animals to live on and in. On a sand flat at low tide one may find starfish, sea urchins, and numerous kinds of crabs and snails. Some of these animals wander over the sand flats when they are submerged, scouring them for bits of food. Some crabs, like the Dungeness, tend to stay in sandy areas because of the methods of self-protection involves burrowing into the sand to hide. (Even when the sand is exposed, watch for depressions in the surface that mimic the shape of the crab's shell. By digging there, you may uncover a crab that stayed buried even as the water receded.) By looking for clam or cockle siphon holes, you will discover these common residents of sandy areas and by digging carefully you may unearth them.

Cobbles and Boulders

Obviously, the size of loose rocks on the beach may range from something just a bit coarser than sand up to boulders too large to be lifted. In general, the larger the general size of the rock pieces, the greater variety of life one might expect to find there. The more stable the hard surface is, the greater protection and anchors it can afford a resident plant or animal. Intertidal areas of cobbles or rocks are often most obviously serving as anchorages for marine plants (most common in the Juneau area, Fucus, the rockweed, the tough, ubiquitous, brown plant with the bulbous reproductive bodies that kids like to pop) and for barnacles and blue mussels that may cover certain rocks of sections of beach in great density. If you begin to look down among the beds of rockweed, barnacles, and mussels and UNDER cobbles and boulders, you will discover an amazing diversity of life forms. Small six-rayed starfish cling beneath medium sized rocks, often brooding clutches of eggs. Blennies up to six inches or so in lenth (one of the two most common intertidally discovered fish) hide under rocks. So do amphipods or sand fleas and tiny crustacean beach scavengers that quickly seek new cover when discovered under their protective rock. Clinging to the surface of the rocks may be limpets, chitons, sponges. Look for the latter particularly under overhangs of larger rocks.

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Because of their ability to serve as anchors and because they offer so many protective niches, rocks on beaches afford some to the best looking places. Don't neglect to have along a magnifying glass so you can really see some of the tiny critters! Guaranteed that the more your look, the more you will see there! Just be very sure that after you turn over a rock to reveal its underside residents, that you replace it so the animals don't dry out and perish!

Bedrock

This is just as exciting a place to poke as cobbles/boulder areas and many of the same inhabitants can be found here - with two general kinds of exceptions. First, obviously this rock surface can't be turned over so the "rock and sand or mud residents" are not here. Second, it is in bedrock areas that you are most apt to find remnant puddles of water - tidepools - that may harbor lots of life, including small anemones with tentacles extended to trap food (they come in a wide variety of gorgeous color combinations), rock hard coralline algae that looks like hard, pink plaster but are actually living plants, tiny immature sculpins, and perhaps little shrimp. Be sure to look carefully in crevasses for sponges, starfish, and other creatures.

THE DISTANCE FROM THE WATER

Each species of marine plant and animal has a particular tolerance to being out of salt water. Some of them, for example, are never found intertidally because they have absolutely no tolerance for exposure to the effects of an air environment. Others can stand being out of salt water for extended periods of time, needing only to be wet by the sea on occasional very high tides. By looking at the beach in a section from its highest high water mark down to the water level on a low, low tide, you can quickly begin to see major differences in plant and animal populations.

The Highest Fringe

At the upper limits of the intertidal zone, least life forms are evident. You may notice that the rocks appear black here. This is because they are covered by a black encrusting lichen or by a blue-green algae that makes these rocks treacherous and slippery when wet. In these upper reaches, too, may be found the common tiny periwinkle - a fat, ridged snail that sometimes seems to pepper the rocks.

The Middle Zone

As you move down toward the water's edge on a low tide, you will be aware of obvious color bands or patches on the beach. There may be banding of Fucus, the common brown rockweed, and of blue-black mussels (the intertidal - and subtidal - bivalve that attaches itself by tiny threads to rocks and pilings and other surfaces), and barnacles. Here too you will begin to see limpets (the species of which are sometimes most quickly identified by how low or high they are found on the beach), amphipods, various starfish, tiny black sea cucumbers, and other forms of life there were not in evidence at higher levels.

The Lowest Zone

As you approach the water's edge, you will not find some of the plants and animals that were evident at higher levels. In general, however, the lower you go in the intertidal zone the greater the diversity of life forms you will find. Here you will find sea urchins, a wide variety of often large starfish, perhaps juvenile king crabs, large white or varicolored sea anemones (if they are out ot water, these will look like squishy, uninviting blobs, but look out into the shallow waters to see the same animals in all their expanded glory), and the larger snails.

So...as you look at any particulat beach for the first time, there is a great deal to think about. Remember that each part of the beach, each kind of surface type, each height from the water, each kind of topographical variation indicates what life may be found there. In general, it is advisable to spend the lowest part of the tidal cycle closest to the water's edge for in that way you will have the maximum amount of time to spend along the beach area that is revealed to us least often and which tends to harbor the greatest diversity of plants and animals.

If you can, acquaint your students with these obvious or subtle variations in the beach habitat for it will enrich their beach experience, too!!!

TIDES

Students can understand some basics about tides and should definitely learn that the height of the water on the beach varies with the stage of the tide and that maximum and minimum tidal levels vary each day.

Tides, in a very simplified kind of explanation, occur because of the gravitational pull of the sun and the moon on the earth. Just as the earth exerts gravitational force (why does an apple fall? why can't we step off into space?), so do these other two bodies. The force of the pull of the sun and moon on a particular place on earth depends on how directly they are in line with that place. The force they exert tends to pull the water away from the earth's surface on the side of the earth facing,thus causing a high tide. Because the relative position of the sun, earth, and moon are constantly changing in a cyclic rhythm, so are the tides.

Activities

Here in Southeast Alaska we experience a tidal cycle that consists of two unequal high tides and two unequal low tides each day. With some students in primary grades and all those in upper grades, you might sit down with a tide table and look at the numbers and explain what they mean. You might even make a simple chart of tide levels and of activities to coincide with various stages of the tide. For instance, it might be much easier to launch a boat when the tide is high but digging clams can best be done on the very lowest tide. Students might be shown the same beach at high and at low tide and through words or art work compare the differences.

Preparation for Field Trip

In preparing for the field trip, discuss tides with the students. Mention the need to be as close to the water as possible when the tide is at its lowest in order to see that strip of beach and the life that is there, for the water quickly comes in and covers it. Talk, too, about the need to be aware of the tide level and thus not to set a pack or bucket next to the water's edge and expect to find it there later if the tide is flooding.

As a teacher you need to be aware of the time of low tide when scheduling your field trip to the beach and in planning the activities that will take place there. The time of very lowest tide should be kept open for observation of what is to be found in the zone nearest the water. Activities such as taking a break for a snack or gathering around buckets to discuss and examine particular animals should occur when the tide is ebbing or flooding.

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Tyler, J. 1976. *The Children's Book of the Seas.* Usborne Pub. Ltd., London. 32 pp. $2.95.

United States Forest Service. *Beach Camping* and other informative publications. Juneau.

University of Alaska. Alaska Sea Grant Program. *Alaska Tidelines,* a Sea Grant Publication for Alaska Schools. Fairbanks.

Plus +++ check with agencies in your area, aquaculture associations, the U. S. Coast Guard, local corporations to see what publications they may have available.

OTHER LEARNING AIDS

The Alaska State Museum has multi-media learning kits available for use by Alaskan schools, including a Salmon kit. Priority use is given to bush schools. Write: Alaska State Museum, Pouch FM, Juneau, Alaska 99811.

Your school can order films through the Alaska State Film Library. Their marine science/oceanography listings are too numerous to mention, but some topics that are dealt with include: marine invertebrates, ocean currents, the beach, whales, life cycle of the salmon, mollusks, tide pool life, marine science careers, sea birds, octopus, the ocean as a food source, fishing techniques, the ecology of the ocean, and seacoast cultures.

The Smithsonian Institution is currently field testing a binder of estuary study activities ($9.68). Activities include: Beachcombing, Mapping, Barnacles, Build A Trap, Fish Adaptations, Fish, Marsh Muck, Crabs, Water in Motion, Menance Oil Slick, Oil Spill Cleanup, and Estuary 3-D Board. For more information write:

SEA (Smithsonian Estuarine Activities)
Chesapeake Bay Center For Environmental Studies
Smithsonian Institution
P. O. Box 28
Edgewater, Maryland 21037

Posters on beach safety and pamphlets on tides, whales, crabs, and other marine topics are available from the Oregon State University Sea Grant Marine Advisory Program. For a catalog and price list (many are free) write:

Extension Communication-Marine Advisory Program
Oregon State University AdS 422
Corvallis, OR 97331

ALASKA SEA WEEK EVALUATION FORM

computer code numbers

1. Town or village_____ (1-4) (5)

2. Grade level_____ (6-7)

3. Number of students involved_____ (8-10)

You may need to review your Alaska Sea Week materials to answer these questions.

4. How many classroom (indoor) activities and worksheets did you use from each book?

Book (Grade level)	Number of activities	
Discovery (K)	_____	(11-12)
Sea Animals (1)	_____	(13-14)
Shells (2)	_____	(15-16)
Glacial & Intertidal Ecology (3)	_____	(17-18)
Birds (4)	_____	(19-20)
Fish (5)	_____	(21-22)
Man's Influence on the Sea (6)	_____	(23-24)

5. What is the total number of field (outdoor) activities used from the 7 books?_____ (25-26)

6. How many periods (1 hr. each) did your class spend on the Sea Week Program?_____ (27-29)

Please check the appropriate box to the right of each question.

	decidedly yes	yes	no opinion	no	decidedly no	
7. Were the Alaska Sea Week materials relevant to your curriculum?	(1)	(2)	(3)	(4)	(5)	(30)
8. Did the Sea Week materials motivate students to improve their math, reading, & writing skills?	(1)	(2)	(3)	(4)	(5)	(31)
9. Did the Sea Week materials upgrade your science program?	(1)	(2)	(3)	(4)	(5)	(32)
10. Did students enjoy the Sea Week activities?	(1)	(2)	(3)	(4)	(5)	(33)
11. Did students develop a greater awareness, appreciation, and respect for the sea?	(1)	(2)	(3)	(4)	(5)	(34)
12. Did students develop decision-making skills necessary for resolution of marine issues?	(1)	(2)	(3)	(4)	(5)	(35)
13. Was the material appropriate for your students' grade level?	(1)	(2)	(3)	(4)	(5)	(36)
14. Was the teacher background section adequate?	(1)	(2)	(3)	(4)	(5)	(37)
15. Were the teacher instructions helpful & complete?	(1)	(2)	(3)	(4)	(5)	(38)
16. Were parents and other community members involved in your Sea Week?	(1)	(2)	(3)	(4)	(5)	(39)
17. Were parents favorably impressed with the Sea Week Program?	(1)	(2)	(3)	(4)	(5)	(40)
18. Did Sea Week help improve the relationship of the school to the community?	(1)	(2)	(3)	(4)	(5)	(41)

19. Rate your overall feelings about the Sea Week MATERIALS on a scale of 1 to 5._____ (42)
(1=high; 5=low)

20. Rate your overall feelings about the Sea Week PROGRAM on a scale of 1 to 5._____ (43)
(1=high; 5=low)

(OVER, PLEASE)

21. How many teachers are in your school? _____
How many are using Sea Week materials?_____ (44-45)

22. Do you plan to introduce the Sea Week materials to other teachers? yes____(1)
no____(2) (46)

23. Do you plan to use the Sea Week materials again? yes____(1) no____(2) (47)

24. Would you be interested in attending a marine education/Sea Week workshop?
yes____(1) no____(2) (48)

If so, list your name and school address:

Name_____

Address_____

25. What other comments do you have? Are there any specific improvements you would suggest?

Please return this completed form to Jill Thayer/Belle Mickelson, Alaska Sea Grant Program, University of Alaska, Fairbanks, Alaska 99701.